2020 Spring Undergraduate Research & Creative Achievements Forum

May 1 - 5, 2020

Abstract book prepared by:

Office of Undergraduate Research

Linda Blockus
Director

K. Heather Tearney
Operations Manager

Samantha Hutchins
Student Worker

Emma McNail
Student Worker

Sophie Walding
Student Worker

Thanks to the following individuals for their assistance:

University of Missouri Libraries

Felicity Dykas
Digital Services Head LIbrarian

Navadeep Khanal
E-Learning LIbrarian and Web Development Administrator

Jeannette Pierce
Associate University Librarian for Research, Access,
& Instructional Services

Ying Hu
Senior Digital Services Library Information Specialist

Brittany Saunders
Digital Services Library Information Specialist

Antanella Tirone
Library Information Specialist

2020 Spring Undergraduate Research & Creative Achievements Forum

May 1st - 5th, 2020

Exhibited online thru a collaboration of the
University of Missouri Libraries
and the
Office of Undergraduate Research

https://tinyurl.com/2020SpringForum

More than 180 students presenting scholarship on a variety of discipilines from across the Mizzou campus.

We would like to thank all of the students, mentors, faculty, and administrators for both their patience and support in transitioning the Forum from a physical presence to this digital exhibition.

It is our hope, that all involved will find this to be an engaging educational experience.

~ Office of Undergraduate Research

Office of Undergraduate Research

Vision

Mizzou strives to advance a culture where all interested undergraduates engage in a quality research or creative scholarship experience.

Mission

The Mission of the Office of Undergraduate Research is to foster and support mentored undergraduate research, scholarship and creative activity in a premiere research environment.

Goals

Fostering growth of the practice of undergraduate research and creative scholarship

Maximizing the student experience and enhancing quality of the experience

Increasing visibility of the opportunities and outcomes of undergraduate research

Serving as a central resource for MU students, mentors, programs, and departments

150A Bond Life Sciences Center
Ph: 573-882-5979
Email: ugr@missouri.edu
undergradresearch.missouri.edu

2020 Spring
Undergraduate Research
& Creative Achievements Forum

Acknowledgements
&
Recognitions

2019-2020 Undergraduate Research Advisory Committee

We would like to thank our Advisory Committee for their insight, support and continued engagement with Undergraduate Research and our office.

Jamie Arndt
Chair, Psychological Sciences

Elizabeth Chang
Associate Professor, English

Roger Fales
Director of Student Success and Mentoring, College of Engineering

Jerritt Frank
Director of Undergraduate Studies, History

Sharyn Freyermuth
Assistant Dean, College of Agriculture, Food and Natural Resources

Lee Ann Garrison
Director of School of Visual Studies

Jung Ha-Brookshire
Associate Dean, College of Human Environmental Sciences

2019-2020 Undergraduate Research Advisory Committee

continued...

Lynda Kraxberger
Associate Dean, Missouri School of Journalism

Antoinette Landor
Assistant Professor, Human Development and Family Science

Nicole Monnier
Associate Dean, College of Arts & Science

Jeannette Pierce
Associate University Librarian for Research, Access, and Instructional Services

Chad Rose
Associate Professor, Special Education

Lisa Scheese
TRiO Student Services Coordinator

David Schulz
Honors Director, Biological Sciences

2019-2020 Undergraduate Research Ambassadors

Amanda Bennett
Senior, Psychology; Spanish

Jenna Bohler
Junior, Biological Sciences; Psychology; Spanish

Madeline Clarke
Senior, Political Science; Geography

Will Costigan
Junior, Biochemistry

Cole Diggins
Senior, Soil Resource Management

Mollie Harrison
Junior, Chemical Engineering

Joshua Miles
Senior, Physics; Economics

Sarah Pribe
Senior, English; International Studies

Muhammad Salim
Senior, Biological Engineering

Delanie Vinzant
Sophomore, Biology; Economics

Grace Wiley
Junior, Biochemistry

Rebecca Winkler
Senior, Biological Sciences

2020 Undergraduate Research Day at the Capitol

This annual event was scheduled for Thursday, April 2, 2020; however, was cancelled due to the pandemic. Congratulations to the fourteen students selected represent MU. We thank the students and their mentors for their time spent in preparation.

Student:	Mentor:
Mary Benoit	Dr. Richard Ferrieri
Cole Diggins	Dr. Stephen Anderson
Ben Frailey	Dr. Prasad Calyam
Sarah Gilmer	Dr. Brandi MacDonald
Mollie Harrison	Dr. Bret Ulery
J.D. Peiffer	Dr. Robert Thomen
Nicholas Pham	Dr. Bongkosh Vardhanabhuti
Micah Turrell	Dr. Manuel Leal
Grace Wiley	Dr. Peter Sutovsky
Colleen Clancy	Dr. Chad Rose
Kalie Crawford	Dr. Chad Rose
Annie Jurgensmeyer	Dr. Chad Rose
Grace Kempen	Dr. Chad Rose
Adrienne Skelton	Dr. Chad Rose

2020 Posters on the Hill Washington, D.C.

Adrienne Skelton with Dr. Chad Rose

POSTERS ON THE HILL 2020

Congratulations to Adrienne Skelton for being selected to represent the state of Missouri at the 24th annual CUR Posters on the Hill event! Her mentor is Dr. Chad Rose (Special Education). This year's event was held virtually on April 21st.

The Impact of Social and Communication Skill Intervention on Reducing Bullying Involvement

Adrienne Skelton and Dr. Chad Rose

Bullying is a pervasive problem facing the nation's youth that impacts the social, behavioral, and academic functioning of those involved. Two of the most notable predictors of bullying involvement are social and communication skill deficits (Rose et al. 2019). It is critical for schools to implement programs and practices for social and communication skill acquisition to improve the lifelong outcomes of all youth, as well as reduce the likelihood of current and future bullying involvement. The present study was designed to reduce and/or prevent bullying involvement by identifying students in grades K–5 with social and communication skill deficits using a behavioral risk screener (i.e., SAEBRS; Kilgus et al. 2012) and providing them with a 10-week social and communication skill intervention in a small-group setting. Pre/post data were collected from all participants and their teachers with the aim of evaluating their involvement in bullying, as well as social, behavioral, and academic functioning. Initial analyses of pre/post data using a repeatedmeasures MANOVA (i.e., mean level differences) revealed that students reported significant increases in prosocial behaviors, academic self-efficacy, and decreased victimization. Students' teachers reported increased prosocial behaviors, emotion regulation, and academic competence. These findings demonstrate the importance of implementing a skill-based intervention designed to improve the social and communication skill acquisition of schoolaged youth as a vehicle for reducing bullying involvement and increasing academic, behavioral, and social functioning. This is especially germane for schools, because all 50 states and Washington, DC, have adopted legislation to address bullying among school-aged youth.

2020 Spring
Undergraduate Research
& Creative Achievements Forum

Student Presenters

Kristina Adler

St. Louis, MO

Senior

Communication Science and Disorders

Sp20-143

Faculty Mentor: Dr. Mili Kuruvilla-Dugdale, Speech Language and Hearing Sciences

A Comparative Study of Articulatory Performance Among Progressive Dysarthrias

Kristina Adler, Alyssa Buie, Tara Fogerty, Madalyn Michael, Makenzie Thoenen, Emma Travis, and Mili Kuruvilla-Dugdale

Disease-related changes in articulation are known to contribute significantly to the progressive loss of speech intelligibility in talkers with amyotrophic lateral sclerosis (ALS) and Parkinson's disease (PD). Although prior studies have primarily investigated articulatory performance in these conditions separately, they support the notion that there may be similar as well as disease-specific mechanisms that contribute to speech loss in these progressive dysarthrias. Further, existing studies suggest that articulatory performance may vary depending on the speech stimuli used. Yet, comparative studies that have systematically investigated articulatory motor performance as a function of stimulus complexity in ALS and PD are lacking. Therefore, the current study sought to compare tongue motor performance in ALS and PD as a function of stimulus complexity at the word level. 3D tongue (tip and dorsum) movement data were obtained from 15 healthy controls and 15 talkers each with PD and ALS for 10 target words that were categorized as either high or low complexity, based on the framework by Kent (1992). Tongue speed and range of motion (ROM) were averaged across 5-10 repetitions of each word, to determine between-group differences in tongue motor performance. Compared to controls, the PD group showed significant reductions in tongue tip ROM only for high complexity words. Although the ALS data are still being analyzed, based on previous studies, significant decreases in movement extent and speed are expected for this group relative to controls even for relatively simple utterances. Clinical and theoretical implications of the findings will be discussed during the presentation.

Madelyn Arends
O'Fallon, MO

Senior
Psychology

Sp20-7

Faculty Mentor: Dr. Nicole Campione-Barr, Psychological Sciences

Funding Source: Human Environmental Sciences Program for Undergraduate Research Experiences (PURE)

College Students Technologically-Mediated Communication with Close Relationship Partners and Influences on Relationship Quality

Madelyn Arends, Yue Guo, Anna K. Lindell, Sarah Killoren, and Nicole Campione-Barr

Technological communication methods are frequently studied to examine the effects on emerging adults' relationship with family members. However, the effect of technological communication methods on emerging adults' overall relationship quality with close other relationship partners (mother, father, sibling, best friend, and romantic partner) is understudied. The present study examines how the frequencies of various technological communication methods differ by emerging adults' close relationship partner, and how the use of different forms of communication may differentially impact relationship quality with each of these partners over time. The current study examined first-year college students (n=258) attending a public university in the Midwest. These participants completed online questionnaires. Frequency of communication with the participants' close other relationship partners were assessed with Technology-Mediated Communication Survey and the Networks of Relationships Inventory that assessed emerging adults' relationship quality with their close others. Asynchronous methods of communication (e.g. emailing and social networking sites) and synchronous methods of communication (e.g. talking on the phone, texting, video chatting, and talking in person) were assessed during the first year (Time 1) and last year of college (Time 2). A series of eight 5(Relationship) X 2(Time) X 2(Gender) mixed model ANOVAs were conducted (one for each type of communication). Findings suggest that while there was little change from year 1 to year 4 of college, there were significant differences in communication between emerging adults' and their relationship partners, but communication with mom, friends, and romantic partners are most frequent. Separate hierarchal regressions were performed to examine the effect of asynchronous and synchronous communication on emerging adults' positive relationship with their close others. It was found that synchronous communication marginally predicted relationship positivity at Time 2 for romantic partners. Both of these findings suggest that emerging adults primarily use technology-mediated communication with those relationship partners they see more frequently.

Brenda Atherton

Columbia, MO

Senior

Psychology; Philosophy

Sp20-123

Faculty Mentor: Dr. Laura King, Psychological Sciences

Narcissism, Meaning in Life, and Subjective Well-Being

Brenda Atherton, Jake Womick, and Laura A. King

Narcissism is positively related to meaning in life (Womick, Foltz, & King, 2019) and is unique among the Dark Tetrad personality traits in its positive association with psychological well-being. This research asked two questions: First, does meaning in life explain the association between narcissism and subjective well-being (SWB)? Second, is significance (believing that one's life matters) more crucial than purpose (being directed by the pursuit of valued goals) or coherence (feeling the works makes sense) to the link between narcissism and global meaning in life?

Studies 1a and 1b were cross sectional studies. In Study 1a (N=415) and Study 1b (N=300) participants on Amazon Mechanical Turk completed measures of global meaning in life, life satisfaction, and narcissism. Study 1a included a measure of self-deceptive enhancement, and 1b included a measure of the facets of meaning (significance, purpose, and coherence). In Study 2, undergraduate students (N=295) completed the same measures from Study 1, in addition to a measure of self-esteem.

In Study 1a, narcissism was positively correlated with SWB, and meaning in life (MIL). Controlling for MIL fully mediated the relationship between narcissism and SWB. In Study 1b, narcissism was positively related to significance, and coherence. Controlling for the significance facet of meaning wiped out the positive associations of narcissism with coherence. Study 2 replicated Study 1a mediation, but did not replicate 1b results for significance. Additionally, Study 2 showed that self-esteem does not explain the link between narcissism and MIL.

The studies show that narcissism contributes to subjective well-being through the experience of meaning in life. Data did not support the facet of significance as being crucial to the link between narcissism and meaning in life. Instead, we found that all three facets of meaning in life were important to understanding the relationship between narcissism and the experience of meaning.

Madison Bellamy

St. Louis, MO

Senior

Psychology; Biological Sciences

Sp20-13

Faculty Mentor: Dr. Amanda Rose, Psychological Sciences

Association of Adolescent Gender Typed Communication Style on Adult Romantic Relationships

Madison Bellamy and Amanda Rose

Major Purpose: It is well studied that youths tend to socialize and converse with their same-gendered peers over those of the opposite sex (Xiao 2018), which leads to different expectations and norms in their relationships. Boys tend to be more controlling and less collaborative with peers, whereas girls have higher expectations in self-disclosure, intimacy, and companionship (Hall 2010, Rose and Rudolph 2006). It has been theorized that this difference in communication styles between men and women may lead to conflict in romantic relationships (Maccoby 1990). The proposed study aims to investigate how adolescent gender role orientation (masculinity and femininity) and communication style impact comfort and influence in both conflict and decision making with a romantic partner.

Procedure: Data were collected in three cohorts across three summers with adolescents who had completed 7th or 10th grade. Friend pairs visited the university laboratory and completed a series of questionnaires, including an assessment of gender role orientation (Boldizar 1991) and self-disclosure (Rose 2002). After the original observation, which was collected between 2007-2009, participants of the three cohorts were contacted in various ways to encourage the completion of a follow-up survey. Upon completion of the survey, they are rewarded $20.

Results: We are contacting the original 628 participants, 270 of which have responded to date. Data analysis is underway and will be completed by January. Results are expected to indicate that individuals who have the most sex typed gender role orientation and communication types will report experiencing lower comfort and influence in cross-sex romantic relationships.

Conclusions and implications: Understanding the influence of early experiences on later comfort and influence with a romantic partner will be helpful in developing prevention or intervention programs to explain how communication style may create challenges.

Lauren Bishop
Fenton, MO

Senior
Political Science; Journalism

Sp20-90

Faculty Mentor: Dr. Bryce Reeder, Political Sciences

Protecting people: How liberal democracies impact the number of dead and missing migrants

Lauren Bishop and Bryce Reeder

By the end of 2018, 70.8 million people had been forcibly displaced worldwide, according to the UNHCR. This growing problem, perpetrated through persecution of peoples for religion, race, gender or otherwise, is understudied in the field of political science. The present research aims to understand why migrants go dead or missing on some countries, but not others. I argue that tenets associated with liberal democracy, such as constitutionally protected civil liberties, strong rule of law, an independent judiciary, and effective checks and balances, help explain this variation. In addition, I posit that this relationship is conditioned by whether a country is a signatory of the 1951 Convention Relating to the Status of Refugees from the UN High Commissioner for Refugees.

I test these expectations by building a global time-series cross-sectional dataset that captures both the regime type and number of dead and missing migrants within each country. The reveals that while migrants most often go missing or die near international borders, regime type and participation in the 1951 Convention significantly explain variation in the number of dead and missing. As the tenets of liberal democracies increase in a country, fewer migrants go missing or die in the country. This finding is robust across model specifications and measures of regime type.

This is also the first global look at how countries react to migrant inflows, which deserves more understanding in the current global climate. This research is the first in the field to begin explaining why migrants go dead and missing on their way to another country. Further research will be needed pertaining to other aspects of government that affect how much protections migrants are afforded.

Abby Blenk

Cincinnati, OH

Freshman

Digital Storytelling; Computer Science

Sp20-70

Faculty Mentor:Katina Bitsicas, Digital Storytelling

Funding Source: ASH Scholars

Utilizing Virtual Reality and Video Installation to Explore Emotional Responses to Death and Dying

Abby Blenk, Fatimah Krgo, Cate Willis, Peter Helm, and Katina Bitsicas

Virtual Reality (VR) has been used in recent research on empathy creation for caregivers to experience what it is like during the final stages of their loved one's lives. California-based Embodied Labs, created a VR experience to help nurses and caregivers, empathize with patients at the end of their lives. The ASH Art of Death Digital Storytelling Research Team utilizes these tools to create an experience for viewers to move through the final stages of death and dying.

The In-Between is an interactive multimedia experience composed of two parts: A projected and VR video. The three scenes are a hospital bed, a burial, and waking to an afterlife, meant to represent the different stages of death. The team set out to create open-ended imagery that would leave room for interpretation from the viewer. Filmed from the perspective of the viewer, participants felt like they were in that environment and experiencing this process themselves.

Participants (N=36) viewed the projection as a group with the video filling the room, while the virtual reality video was experienced individually. The majority of participants (80.56%) felt the VR experience led them to reflect on mortality more than the projected video. The majority of participants (63.89%) also felt a greater than average sense of peace, whereas a minority (16.67%) of participants felt a greater than average sense of anxiety.

The data is a preliminary indication of what to study further: The experiential aspect of the study limited participants in the time allowed for data collection, so data is not a representative sample. Results indicate how the level of immersion in a death experience affects the thoughts and feelings of participants. Giving viewers the opportunity to conceptualize their own death could create an accepting mentality around dying and encourage open conversation.

Anna Blue

Joplin, MO

Senior
Psychology

Sp20-83

Faculty Mentor: Dr. Laura King, Psychological Sciences

Alzheimer's Caregiving and Meaning in Social Processes

Anna L. Blue, Hope E. Rose, Christopher A. Sanders, and Laura A. King

Previous research has extensively demonstrated that Alzheimer's Disease (AD) has a variety of negative outcomes for the sufferer and their caregivers (Bosboom, Alfonso, Eaton, & Almeida, 2012; Barbe et al., 2018). Research has been done in the past showing that general forgetfulness, due to carelessness, is negatively correlated with meaning in life (MIL) (King & Geise, 2011). We hypothesize that even when the cause of forgetfulness is organic, there will still be a negative correlation between MIL and being forgotten.

Study 1: Amazon MTurk workers (n=328) reported on depression, affect, aspects regarding their relationship to the person with Alzheimer's, the Alzheimer's Questionnaire (Sabbagh et al., 2010) and MIL (Redloff, 1991; Sabbagh et al., 2010; John, 1999; Frazier, Oshi & Kaler, 2006). Regression and correlation analyses of the questionnaires were run.

Study 2 and 3: Study two and three are in the preliminary stages of data collection. Study two is a scenario study where participants are asked to imagine if their significant other having a degenerative disease that either affects memory loss or doesn't (e.g. stroke) and report on their predicted MIL and well-being. Study three will collect data from significant others/peers of people with AD.

The more often a person is remembered by their loved one, the higher their reported MIL ($r=.535$, $p=.003$), but this was only when they reported being a romantic partner of the person with Alzheimer's. This result is interesting because even when controlling for affect and how severe the loved one's symptoms were, the correlation was strong. We also found interesting results showing that the more a participant seems to be coping with their loved one's disease, the higher their MIL ($r=.119$, $p=.041$).

One's relationship to the person with Alzheimer's plays a significant moderating role in whether or not being forgotten affects one's MIL and well-being.

Katherine Boley

Camdenton, MO

Sophomore
Communication Science and Disorders;
Romance Languages (Spanish)

Sp20-128

Faculty Mentor: Dr. Nicholas Smith, Speech, Language and Hearing Sciences

Funding Source: Richard Wallace Faculty Incentive Grant from the Mizzou Alumni Association.

An investigation of the timing of mother-child dialogue in families in poverty

Katherine A. E. Boley, Melanie H. Grupka, and Nicholas A. Smith

Children in low-SES families tend to have smaller vocabularies and lower scores on measures of school readiness. Children's language environment is likely an important factor, with children in poverty encountering 30 million fewer words before the age of four than children in more affluent families (Hart & Risley,1995; "30-million-word gap"). Much less is known about the detailed timing of mother-child dialogue, and how these factors may influence language development. In this study we examine video recordings of mother-child dialogue from families who participated in the nationwide evaluation of the Early Head Start (EHS) program. Mother-child interactions were coded at three ages (14, 24, and 36 months) for various temporal measures, such as number of utterances, response latency, duration of utterances, and the number of interruptions. Our previous work identified a correlation between the timing of maternal and child utterances, as well as age-related decreases in response latency (Smith & McMurray, 2018). We extend this work with the EHS database to examine two overarching questions: What maternal predictors correspond to differences in these temporal measures?, and What differences in child language outcomes are predicted by differences in these temporal measures? Some such maternal predictors we will analyze are demographic factors, maternal mental health, and parenting behavior. Some child outcomes we will analyze are behavior, vocabulary, and academic outcome. Our preliminary results suggest that mothers with higher levels of depression have slower or more variable response latencies, and we expect to continue finding other relationships such as this as we analyze the data further.

Ashley Boone

Waynesville, MO

Senior

Biological Sciences; Psychology

Sp20-120

Faculty Mentor: Dr. Moshe Naveh-Benjamin, Psychological Sciences

Adult Age-Related Differences in Associative Memory for Word Pairs: Evidence for Levels of Specificity in the Verbal Domain

Ashley Boone, Nathaniel Greene, and Moshe Naveh-Benjamin

Abstract withheld due to proprietary permissions.

Courtney Botkins

Cairo, MO

Junior
Psychology

Sp20-28

Faculty Mentor: Dr. Shannon Holmes, Educational, School & Counseling Psychology

A Systematic Review of Treatment Fidelity for Behavioral Intervention in Schools

Courtney Botkins, Kennedy Hoke, and Shannon Holmes

Some estimates suggest that over 4 million school-age youth in the United States suffer from behavior problems that impair their academic, emotional, and social functioning. There has been an increased effort to implement evidence-based behavior interventions in schools. Treatment fidelity is crucial to understanding how an intervention was implemented and determining whether the intervention is effective. Previous reviews of treatment fidelity have revealed that most studies fail to report fidelity data. The purpose of this study was to systematically review treatment fidelity data reported in experimental studies of school-based behavioral interventions between 2008 and 2019. Preliminary results of the review will be presented along with implication to inform future research and practice.

Lane Burdette

Ozark, MO

Senior

Psychology; International Studies (Peace Studies)

Sp20-115

Faculty Mentor: Dr. Denis McCarthy, Psychological Sciences

Modeling Decision Strategy when Selecting a Driver After Drinking

Lane Burdette, Olivia Warner, Rachel Wesley, Clintin Davis-Stober, and Denis M. McCarthy

Purpose

Alcohol-related car crashes cause over 10,000 fatalities each year (Voas & Fell, 2013). Little research has examined the decision to ride with someone who has been drinking (Hultgren et al., 2018). Studies have observed that: 1) use of a designated driver is common, 2) people frequently "switch" designated drivers, and 3) many designated drivers are still above .05% BAC.

This study seeks to assess strategies used in deciding between driving or riding after consuming alcohol. Specifically, we will evaluate how individuals decide whether they should drive or ask a friend to drive, as a function of the number of drinks consumed by each individual. The study will also evaluate the effects of car ownership, participant gender, and perceptions about alcohol impaired driving on this decision process. Finally, we will test whether the decision process used is associated with self-reported alcohol impaired driving or riding with an alcohol impaired driver.

Procedures

Participants (expected $N = 40$) will complete a single laboratory session and respond to computerized measures of alcohol use, alcohol impaired driving, and alcohol impaired driving/riding risk sensitivity. Participants will complete a task where they are presented with information regarding their own and a friend's hypothetical drink consumption (from 0-8 drinks), before choosing which of the pair should drive. In a randomly-assigned between-groups design, we will vary whether the car available to drive is their own.

Results

An extension of the Bayesian "change-point" method (Lee, 2019) will estimate the probability of selecting self or other to drive as number of drinks changes. Chi-square and regression analysis will test whether strategy classification differs across car ownership conditions, and is associated with drinking and alcohol impaired driving. Results can have important implications for interventions aimed at increasing the use of appropriately-selected designated drivers.

Emma Burton

Columbia, MO

Freshman
Physics

Sp20-77

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Coping Strategies in Adolescents: Gender Differences and Implications for Adolescent Health

Emma Burton, Brayden Langendoerfer, Daniella Reyes, Llanna Reinwald, and Sarah Borowski

Coping strategies have important implications for adolescent health, including friendship adjustment, emotional well-being, and physical well-being. In terms of friendship adjustment, adolescents who use active coping strategies are more likely to have positive friendship quality (Shin & Ryan, 2012). Research also finds that coping strategies have implications for emotional adjustment, such that adolescents using avoidance coping are more likely to be isolated and anxious (Shin & Ryan, 2012). In terms of physical health, avoidant coping styles have been linked to negative physical health (Wilson et al., 2005). There is also evidence that the association between coping styles and well-being vary depending on gender (Wilson et al., 2005). In the current study, we will examine adolescents' coping in relation to their well-being and whether the relations differ for girls and boys. Participants are friends in 8th, 9th, and 10th grades and were asked to complete survey questionnaires. They completed the Brief COPE (Carver, 1997), which assesses coping strategies. For example, items assess active coping (i.e. taking actions to fix the situation) and avoidance coping (i.e. denying the situation exists). The adolescents also completed the Friendship Quality Questionnaire (Rose 2002 revision of Parker and Asher 1993). To assess emotional well-being, adolescents completed the Multidimensional Anxiety Scale for Children (March et al., 1997) and the Center for Epidemiological Studies Depression Scale (Eaton et al., 2004). The Short Form (36) Health Survey (RAND Health; rand.org) was used to assess physical well-being. Correlational analyses will examine the relations between coping and well-being. T-tests will be used to compare girls and boys in their coping and well-being. Correlational analyses will also test whether there are gender differences in the associations between coping strategies and well-being.

Maria Ceriotti

St. Louis, MO

Senior
Psychology

Sp20-86

Faculty Mentor: Dr. David Geary, Psychological Sciences

Longitudinal Relationships Between Achievement, Anxiety, and Attitudes in Mathematics in Middle School Children

Maria Ceriotti and David Geary

Abstract withheld due to proprietary permissions.

Nick Childers

Spokane, MO

Freshman
Physics (Astronomy); Mathematics

Sp20-142

Faculty Mentor: Dr. Benton Kidd, Museum of Art & Archaeology

Funding Source: ASH Scholars

Realtime Reactions to Suicide and Martyrdom vs. the Visual Record

Nick Childers, Luci Cook, Wes Goodwin, Lauren Greiner, Peter Helm, and Benton Kidd

Death is a uniquely personal yet universal experience, one that has long been shared with others through artistic processes. Throughout history and across mediums, artists have further explored the theme of death in a myriad of ways. In our study we use examples of historical art representing suicide and martyrdom to question how the act of viewing might influence the thoughts and feelings of observers. Do controversial modes of death represented in art mitigate feelings of death-anxiety or exacerbate them? Are there connections between a participant´s demographics and their feelings on these subjects? Additionally, we explored how death and sex are often inextricably related, and respondents were asked to gauge erotic overtones in the images. An online study conducted using Amazon's MTurk examined these questions. Individuals (N = 450) completed personality and individual difference measures regarding their perceptions of various forms of death, religious faith, violence, and religion in visual art. Participants were shown artwork chosen to stimulate thoughts about suicide, martyrdom, and eroticism as well as neutral control images. The study further examined how viewing artistic expressions of certain modes of death, sometimes with overtones of eroticism, can influence an individual's outlook on mortality. Analyses of the data also informed researchers whether engaging with images led respondents to further reflect about anxieties and other emotions associated with death, and how these might differ between personality types. More broadly, this study provides insight into the role that viewing art can play in helping people cope with mortality.

Sydney Chism

Versailles, MO

Senior
Psychology

Sp20-17

Faculty Mentor: Dr. Moshe Naveh-Benjamin, Psychological Sciences

Funding Source: McNair Scholars Program

Levels of specificity in associative episodic memory: Insights from graded responses

Sydney Chism, Nathaniel R. Greene, and Moshe Naveh-Benjamin

The specificity of older adult associative episodic memory has been tested. We already know from the literature that there is a deficit in older adult associative memory (Naveh-Benjamin, 2000) and that there is a possibility that older adult memory is fuzzier than younger adults as well (Brainerd & Reyna 1995). The hypothesis that is being tested is older adults can retrieve the gist of memories, but retrieval is not as specific as it is for younger adults. Studying different face-scene pairs and then recalling them as being "intact" (the exact same) or "recombined" (a different pair) in the test phase proved that both younger and older adult participants remember the gist of memories, but the graded responses of high, medium, or low confidence levels shows that older adults are not as confident of the highly specific representations.

Colleen Clancy

St. Louis, MO

Junior

Secondary Education (Mathematics Education)

Sp20-63

Faculty Mentor: Dr. Chad Rose, Special Education

Improving Social Skills and Communication to Reduce Bullying among Youth

Colleen Clancy, Kalie Crawford, and Chad Rose

Social and communication skills are critical components of student success. Students who have social and communication skill deficits often experience higher rates of bullying victimization, and decreased prosocial behaviors and emotional regulation. It is important to implement programming that will address these deficits to improve how a student is situated with their social environment. The purpose of this project was to implement a 10-week social and emotional learning (SEL) program for youth in grades K-5 that have been identified with social and communication skill deficits to improve the students' prosocial behaviors and emotional regulation, and decrease their experiences with bullying victimization. This project was designed to support the individual needs of students who are struggling with social and communication skill deficits. These deficits are related to detrimental short- and long-term outcomes, including lower levels of prosocial behaviors, decreased emotional regulation, and escalated rates of bullying involvement. In this project, approximately 500 youth in grades K-12, received 10 weeks of social and communication skill instruction via a web-based intervention that involved webisodes related to social interactions, social and communication skill acquisition, and recognizing, reporting and responding to bullying incidents. Results of this project demonstrated the utility of implementing a SEL program to improve social and communication skill acquisition. Based on a repeated measure multivariate analysis of variance (MANOVA), youth reported increases levels of prosocial behaviors and decreased bullying victimization, while their teachers reported increased prosocial behaviors and emotional regulation. This project demonstrated that implementing a 10-week SEL program could improve social and communication skill acquisition for a target subset of youth, while increasing prosocial behaviors and emotional regulation, and decreasing involvement in bullying. Based on the project's results, it is recommended that schools consider implementing a targeted social and emotional learning curriculum to improve student outcomes and well-being.

Luci Cook

Camdenton, MO

Senior

International Studies (European Studies); German

Sp20-137

Faculty Mentor: Dr. Benton Kidd, Museum of Art & Archaeology

Funding Source: ASH Scholars

Realtime Reactions to Suicide and Martyrdom vs. the Visual Record

Luci Cook, Nick Childers, Wes Goodwin, Lauren Greiner, Peter Helm and Benton Kidd

Death is a uniquely personal yet universal experience, one that has long been shared with others through artistic processes. Throughout history and across mediums, artists have further explored the theme of death in a myriad of ways. In our study we use examples of historical art representing suicide and martyrdom to question how the act of viewing might influence the thoughts and feelings of observers. Do controversial modes of death represented in art mitigate feelings of death-anxiety or exacerbate them? Are there connections between a participant´s demographics and their feelings on these subjects? Additionally, we explored how death and sex are often inextricably related, and respondents were asked to gauge erotic overtones in the images. An online study conducted using Amazon's MTurk examined these questions. Individuals (N = 450) completed personality and individual difference measures regarding their perceptions of various forms of death, religious faith, violence, and religion in visual art. Participants were shown artwork chosen to stimulate thoughts about suicide, martyrdom, and eroticism as well as neutral control images. The study further examined how viewing artistic expressions of certain modes of death, sometimes with overtones of eroticism, can influence an individual's outlook on mortality. Analyses of the data also informed researchers whether engaging with images led respondents to further reflect about anxieties and other emotions associated with death, and how these might differ between personality types. More broadly, this study provides insight into the role that viewing art can play in helping people cope with mortality.

Grace Corley

Leawood, KS

Senior

Journalism (Strategic Communication)

Sp20-41

Faculty Mentors: Jamie Flink, Strategic Communication;
Jon Stemmle, Strategic Communication

Attitudes and Perceptions towards health care in the 18-to-24-year old Youth and Young Adult (YAYA) demographic

Grace Corley, Mackenzie Elliott, Jamie Flink, and Jon Stemmle

According to Axios, Americans spent $3.65 trillion on healthcare in 2018. This major industry touches every person in the country and is the topic of many headlines. We were interested in understanding how the youth and young adult (YAYA) market of 18- to 24-year-olds perceives topics such as healthcare, health institutions and mental health. For our study, we explored the ideas of YAYA individual's perceptions of modern day health care, how that perception changed over time, how YAYA consumers perceive mental health in comparison to physical health and what healthcare practices YAYA individuals want in the workplace. We examined data from surveys done over a five-year period from 2016-2020, which were developed and distributed to a national respondent panel resulting in a yearly sample comprising 700+ completed responses. From our analysis, we uncovered findings that showed healthcare is not a straight-forward topic for the 18- to 24-year-old YAYA market. Overall, this market has a different view on healthcare. At times, they can be skeptical about actions such as purchasing health care or visiting the doctor. However, they want this topic to be a larger conversation, whether it be in the workplace or when deciding to go to the doctor.

Rachel Coryell

Conway, MO

Senior
Biological Engineering

Sp20-148

Faculty Mentor: Dr. Trent Guess, Physical Therapy

Instrumented Assessment of Abnormal Muscle Reaction

Rachel Coryell and Trent Guess

Muscle spasticity affects more than 12 million people worldwide and 80 percent of this population is diagnosed with cerebral palsy (Nationwide's Children's Hospital). Unfortunately, it is very difficult for health care professionals to manually assess the severity of the patient's muscle spasticity with accuracy, and thus makes it difficult to determine the appropriate treatment. To combat these difficulties, an automated method using two sensors was developed for the measurement of the spastic joint angle. Throughout the course of the experiment, it became apparent that the spasticity has a very clear signature in the position data. This signature allowed for the identification of the joint angle and velocity at the moment of spasticity. After further refinement, this device should make diagnosis and treatment of muscle spasticity easier and more accurate.

Will Costigan
Bloomington, IL

Junior
Biochemistry

Sp20-127

Faculty Mentor: Dr. Scott Peck, Biochemistry

Funding Source: Life Sciences Undergraduate Reserarch Opportunity Program (LSUROP)

Uncovering the roles of Arabidopsis Thaliana E3L2 in pattern triggered immunity

Will Costigan, Jared Ellingsen, and Scott Peck

Understanding molecular interactions between plants and pathogens is a necessary step in the development of disease prevention and management strategies. Plants utilize a multifaceted innate immune response to prevent infection by pathogens. The first layer of this response is Pattern Triggered Immunity (PTI). In the model plant Arabidopsis thaliana, MAP Kinase Phosphatase 1 (MKP1) has been identified as a negative regulator of PTI. As a result, mkp1 mutants are more resistant than wild type plants to bacterial infection. Bacteria are a diverse and damaging class of plant pathogens. Many bacteria, such as Pseudomonas syringae, utilize a Type III Secretion System (T3SS) to inject host plants with effector proteins that disable the host immune system. The components of this molecular syringe are expressed upon detection of chemical secretions from host plants. Interestingly, exudate samples collected from mkp1 mutant plants contain lower amounts of T3SS-inducing chemical signals than wild type plants. We hypothesize that the decreased abundance of these chemicals in mkp1 exudate is due to the activity of the defense-related E3 Ubiquitin ligase E3L2. Consistent with this, our preliminary data suggest that e3l2 knockout mutants cannot properly manifest PTI. To determine whether E3L2 is genetically linked to MKP1, double knockout mutants have been generated from a cross of the two single mutants. Assays performed with these plants and P. syringae will shed light on the potential genetic interactions between E3L2 and MKP1 during PTI, leading to a more complete understanding of plant innate immunity. .

Kalie Crawford

Frankenstien, MO

Junior
Elementary Education

Sp20-105

Faculty Mentor: Dr. Chad Rose, Special Education

Improving Social Skills and Communication to Reduce Bullying Among Youth

Kalie Crawford, Colleen Clancy, and Chad Rose

Social and communication skills are critical components of student success. Students who have social and communication skill deficits often experience higher rates of bullying victimization, and decreased prosocial behaviors and emotional regulation. It is important to implement programming that will address these deficits to improve how a student is situated within their social environment. The purpose of this project was to implement a 10-week social and emotional learning (SEL) program for youth in grades K-5 that have been identified with social and communication skill deficits to improve the students' prosocial behaviors and emotional regulation, and decrease their experiences with bullying victimization. This project was designed to support the individual needs of students who are struggling with social and communication skill deficits. These deficits are related to detrimental short- and long-term outcomes, including lower levels of prosocial behaviors, decreased emotional regulation, and escalated rates of bullying involvement. In this project, approximately 500 youth in grades K-12, received 10 weeks of social and communication skill instruction via a web-based intervention that involved webisodes related to social interactions, social and communication skill acquisition, and recognizing, reporting, and responding to bullying incidents. Results of this project demonstrated the utility of implementing a SEL program to improve social and communication skill acquisition. Based on a repeated measures multivariate analysis of variance (MANOVA), youth reported increased levels of prosocial behaviors and decreased bullying victimization, while their teachers reported increased prosocial behaviors and emotional regulation. This project demonstrated that implementing a 10-week SEL program could improve social and communication skill acquisition for a targeted subset of youth, while increasing prosocial behaviors and emotional regulation, and decreasing involvement in bullying. Based on the project's results, it is recommended that schools consider implementing a targeted social and emotional learning curriculum to improve student outcomes and well-being.

Gage Crum
Ashland, MO

Sophomore
Biological Sciences

Sp20-54

Faculty Mentor: Dr. Sara Gable, Nutrition and Exercise Physiology

An Active Counting and Set Labeling Approach to Early Number Learning

Gage Crum, Mary Dunleavy, Afiah Mohd Fozi, Katie Frakes, Tito Plaza, and Sara Gable

Preschoolers' quantitative competencies are predictors of math achievement up to age 15 years and are linked with economic outcomes after high school. This research presents findings from a counting and set-labelling intervention that aimed to move at-risk children more quickly toward cardinal principle knowledge. Cardinal principle knowledge (CPK) is the first conceptual milestone in early mathematical development and acts as a "gatekeeper" to acquisition of later number concepts. Further, attaining cardinal principle knowledge earlier is associated with better future math outcomes. For this project, 58 children in the first year of preschool (average 46 months) were recruited from the CPS Title I Preschool to participate. Children were assessed on their enumeration, verbal counting, cardinal knowledge, numeral recognition, and magnitude comparison abilities. Thirty-six children who scored poorly on the measure of CPK were then randomized, by score, into one of three groups: 1) a sedentary counting and set-labeling intervention; 2) an active counting and set-labeling intervention; or, 3) a no-intervention control group. Children in the first two groups met with an experimenter up to six times over a three- to four-week period. During the first session, children repeated the numeracy assessments and were introduced to the intervention. For sessions two through up to five, children practiced counting and set-labeling. The final session began with a brief intervention session and was followed by post-testing. Children in the no-intervention control group were pre- and post-tested using the same time frame. Data collection is still underway at CPS; analyses will compare children's quantitative competencies across groups and time. Based on past research, we hypothesize that children in the active intervention group will show the largest gains in cardinal principle knowledge when compared to the non-active intervention group and the no-intervention control group.

Quinn Cunningham
Columbia, MO

Sophomore
Linguistics; Physics

Sp20-167

Faculty Mentors: Dr. Michael Marlo, Linguistics;
Dr. Rebecca Grollemund, English

Funding Source: ASH Scholars

Language Vitality Study on 3 Luyia Varieties

Madelyn Arends, Yue Guo, Anna K. Lindell, Sarah Killoren, and Nicole Campione-Barr

This project assesses the language vitality of three Luyia language varieties spoken in Western Kenya: Bukusu, Wanga, and Tiriki. Previously, 72 language vitality questionnaires were distributed to speakers of 9 different Luyia varieties by members of the ASH *Documenting Luyia Together* team at the University of Missouri. In this project, the results of these questionnaires were studied to synthesize an overall assessment of language vitality. Parameters included the average age of speakers, the prevalence and place of language use, language transmission, language use through different forms of media, and pride in language use. We conclude that Bukusu, Wanga, and Tiriki all have a high degree of language vitality. In the homelands of these subtribes, the local languages are the primary mode of public communication and virtually all children growing up in the rural environments learn to speak their native language fluently. A variety of media are used in the languages, such as social networking, writing, TV and radio, and newspaper. There are varying levels of vitality in the use of oral literature, though in none is the ongoing transmission oral literature completely safe, due to more frequent movement into urban environments and competing forms of entertainment like TV. Private schools are universally cited as a danger to the local languages, discouraging and even punishing students for using languages other than English or Swahili. Survey respondants commonly want more education to be taught in the local language; both for language vitality and for easier learning of students whose first language is for example either Bukusu or Wanga or Tiriki. These results suggest that a community-led effort towards language revitalization will help the long-term vitality of the languages. Because of the current population-age distribution in Western Kenya, language vitality will be affected greatly by how the youth continue to use the languages.

Drew Dahlquist

Kansas City, MO

Freshman
Computer Science; Mathematics

Sp20-96

Faculty Mentor: Dr. Prasad Calyam, Electrical Engineering & Computer Science

Funding Source: National Science Foundation

Drone Computation Offloading, Control, and Networking (COCoNet)

Drew Dahlquist, Alicia Esquivel, Chengyi Qu, and Prasad Calyam

The continuous evolution of commercial Unmanned Aerial Systems (UAS) is fueling a rapid advancement in the fields of network edge-communication applications for smart agriculture, smart traffic management, and border security. A common problem in UAS research and development is the cost related to deploying and running realistic UAS testbeds. Due to the constraints in safe operation, handling limited energy resources, and government regulation restrictions, UAS testbed building is time-consuming and not suitable for high-scale experiments. In addition, experimenters have a hard time creating repeatable and reproducible experiments to test major hypotheses.

In this paper, we present a set of design principles for performing trace-based NS-3 simulations that can be helpful for realistic UAS experiments. We feed the NS-3 simulator with real-world UAS traces including various mobility models, geospatial link information and video analytics QoS measurements obtained from real-world data-gathering efforts. Our design fits within a hierarchical UAS platform with a suite of visual and geolocation applications that provides a 'common operating picture' view of UAS video analytics. The simulator scripts support the ability to integrate different Unmanned Aerial Vehicle (UAV) configurations, wireless communication links (air-to-air; air-to-ground), as well as mobility routing protocols, to evaluate algorithms pertaining to the management of energy consumption, video analytics performance, and networking protocols. We demonstrate our simulator scripts using a map interface with dynamic contextual markers functionality that helps with the management of several UAVs in application scenarios relating to: (a) smart city traffic management, and (b) disaster incident management.

Caroline Davey

Oswego, IL

Sophomore
Psychology

Sp20-71

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Adolescents' Emotional and Physiological Reactivity to Positive and Negative Friendship Interactions

Caroline Davey, Gabrielle Scott, Christine Schulze, Sarah Borowski, Ashley Groh, and Amanda Rose

Friendship interactions have important implications for adjustment during adolescence (Furman & Rose, 2015). Adolescents' negatively-focused problem talk with friends is linked to increases in depressive symptoms (e.g., Schwartz-Mette & Rose, 2012) whereas talking to friends about positive life events has been linked to lower depressive symptoms (Smith, 2015). Less is known, however, about adolescents' reactivity to friendship interactions. The current study examines adolescents' emotional and physiological reactivity to both positive and negative valence interactions with friends. Participants were 8th-10th graders who participated with a same-gender friend. For the negative valence task, the friends discussed a personal problem together for sixteen minutes. For the positive valence task, the friends planned a party together for seven minutes.

To assess emotional reactivity, adolescents reported on positive and negative emotions using the Positive and Negative Affect Scale (PANAS; Watson, Clark, and Tellegen, 1988). PANAS surveys were administered before and after each task to assess changes in the participants' emotional states. Participants indicated how much they currently felt positive emotions (e.g., happiness) and negative emotions (e.g., hostile) on a scale of 1 (not at all) to 5 (very much so).

To assess physiological reactivity, respiratory sinus arrhythmia (RSA) was measured using heart rate sensors and a respiration belt. A resting baseline was collected by asking participants to sit quietly and clear their minds for three minutes before each task. RSA was measured continuously during each interaction task. The physiological data was edited and reduced into 30-second segments using MindWare. For analyses, average RSA scores were computed for each baseline (pre-task) assessment and were averaged across both the valence tasks.

Paired t-tests were used to assess changes in adolescents positive and negative emotions as well as RSA activity from before to after each task.

Kathryn Donnelly
St. Louis, MO

Senior
Psychology

Sp20-1

Faculty Mentor: Dr. Nicole Campione-Barr, Psychological Sciences

The Differential Impact of Parent-Child Conflict on Adolescent Adjustment

Katy Donnelly, Chris Odudu, and Nicole Campione-Barr

Research in psychology has frequently shown an increase in parent-child conflict during adolescence (Laursen, Coy & Collins, 1998). Greater parent-child conflict is associated with greater psychological distress symptoms and a decline in positive mental health for adolescents (Shek, 1998). Because first- and second-born siblings experience parental conflict differently (Shanahan et al., 2007), the strength of the relationship between parent-child conflict and adolescent adjustment may also differ between siblings. The present study investigates how this association differs by birth order (first- vs. second-born), gender (boys vs. girls), and type of adjustment (internalizing vs. externalizing problems). Participants were 145 predominantly White and middle-class families, consisting of at least one parent and their first- and second-born children. Parents and adolescents completed measures on their conflict frequency, conflict intensity, and internalizing and externalizing adjustment problems. Results indicate that adolescent birth order and gender moderate the effects of parent-child conflict in terms of depression, self-esteem, and problem behavior. These findings point to the importance of studying siblings' unique conflict experiences to discover within-family differences. Results can be used by researchers and therapists to more fully understand how gender and birth order play a role in family conflict and individual adjustment.

Casandra Draudt

Hannibal, MO

Junior
Russian; History

Sp20-141

Faculty Mentor: Dr. Jamie Arndt, Psychological Sciences

Funding Source: ASH Scholars

The Art of Death: The Effects of Viewing Artistic Paintings of Death on Satisfaction with Life

Casandra Draudt, Javier K. Cuenca, Jarrod Russo, Peter Helm, and Jamie Arndt

Mortality related themes have been the subject of art for thousands of years. Death has been represented both as positive and negative, as an end and as a beginning, even as a personified being. A prominent theory in psychology, Terror Management Theory (TMT; Greenberg et al., 1986), suggests awareness of one's inevitable death is a driving force behind a wide range of human behavior. Studies (Routledge et al., 2010) have found, for example, that reminding individuals of their mortality can decrease people's satisfaction with life (SWL). Some research has used graphic imagery to activate death-related cognitions and elicit defensive reactions. However, it remains untested whether the emotional content of death-related imagery – specifically as presented in artistic paintings - differentially influences people's psychological reactions. To assess this question, we conducted a pilot study, (*N = 836*) in which we selected 225 paintings that portrayed death as relatively positive or negative. Participants evaluated these paintings on various dimensions including how much they evoked thoughts of death as well as positive and negative emotions. We selected paintings that equally evoked thoughts of death but differed in their emotional content. In a second study (*N = 513*) participants were randomly assigned to one of four conditions: viewing paintings portraying death with negative emotions, paintings portraying death with mixed emotions (both positive and negative), writing about the thoughts and emotion evoked by death, and a control condition. Participants then completed a measure of SWL and demographic questionnaires. Results indicate that paintings portraying death with mixed emotions led to greater SWL than did the other conditions. This effect was moderated by participant education, such that death paintings containing mixed emotions increased SWL primarily among those with less formal education. Other effects, implications, and future directions are discussed.

Mikaela Drewel

St. Clair, MO

Senior

Psychology; Biological Sciences

Sp20-15

Faculty Mentor: Dr. David Beversdorf, Neurology

Gene/prenatal stress model and diet effects on litter size in mice

Mikaela Drewel, Briana Kille, and David Beversdorf

Abstract withheld due to proprietary permissions.

Mary Dunleavy
Kanakee, IL

Senior
Human Development and Family Science
(Child Life Specialist)

Sp20-55

Faculty Mentor: Dr. Sara Gable, Nutrition and Exercise Physiology

An Active Counting and Set Labeling Approach to Early Number Learning

Mary Dunleavy, Gage Crum, Afiah Mohd Fozi, Katie Frakes, Tito Plaza, and Sara Gable

Preschoolers' quantitative competencies are predictors of math achievement up to age 15 years and are linked with economic outcomes after high school. This research presents findings from a counting and set-labelling intervention that aimed to move at-risk children more quickly toward cardinal principle knowledge. Cardinal principle knowledge (CPK) is the first conceptual milestone in early mathematical development and acts as a "gatekeeper" to acquisition of later number concepts. Further, attaining cardinal principle knowledge earlier is associated with better future math outcomes. For this project, 58 children in the first year of preschool (average 46 months) were recruited from the CPS Title I Preschool to participate. Children were assessed on their enumeration, verbal counting, cardinal knowledge, numeral recognition, and magnitude comparison abilities. Thirty-six children who scored poorly on the measure of CPK were then randomized, by score, into one of three groups: 1) a sedentary counting and set-labeling intervention; 2) an active counting and set-labeling intervention; or, 3) a no-intervention control group. Children in the first two groups met with an experimenter up to six times over a three- to four-week period. During the first session, children repeated the numeracy assessments and were introduced to the intervention. For sessions two through up to five, children practiced counting and set-labeling. The final session began with a brief intervention session and was followed by post-testing. Children in the no-intervention control group were pre- and post-tested using the same time frame. Data collection is still underway at CPS; analyses will compare children's quantitative competencies across groups and time. Based on past research, we hypothesize that children in the active intervention group will show the largest gains in cardinal principle knowledge when compared to the non-active intervention group and the no-intervention control group.

Josiah Dycus

Kansas City, MO

Sophomore
Business Administration (Marketing)

Sp20-22

Faculty Mentor: Dr. Christopher Josey, Communication

Funding Source: ASH Scholars

Examining the portrayals of race within Latinx focused news outlets

Josiah Dycus, Jackson Hale, Julia Gilman, and Kobe Gibson, and Christopher Josey, and Andrea Figueroa Caballero

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four Latino online media outlets (e.g., Remezlca, Latina.com, Latino Voices, and El Día News), with a final sample of *N=600*. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of Latinos in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Mackenzie Elliot

Lee's Summit, MO

Senior

Journalism (Strategic Communication)

Sp20-40

Faculty Mentors: Jamie Flink, Strategic Communication;
Jon Stemmle, Strategic Communication

Attitudes and Perceptions towards health care in the 18-to-24-year old Youth and Young Adult (YAYA) demographic

Mackenzie Elliott, Grace Corley, Jamie Flink, and Jon Stemmle

According to Axios, Americans spent $3.65 trillion on healthcare in 2018. This major industry touches every person in the country and is the topic of many headlines. We were interested in understanding how the youth and young adult (YAYA) market of 18- to 24-year-olds perceives topics such as healthcare, health institutions and mental health. For our study, we explored the ideas of YAYA individual's perceptions of modern day health care, how that perception changed over time, how YAYA consumers perceive mental health in comparison to physical health and what healthcare practices YAYA individuals want in the workplace. We examined data from surveys done over a five-year period from 2016-2020, which were developed and distributed to a national respondent panel resulting in a yearly sample comprising 700+ completed responses. From our analysis, we uncovered findings that showed healthcare is not a straight-forward topic for the 18- to 24-year-old YAYA market. Overall, this market has a different view on healthcare. At times, they can be skeptical about actions such as purchasing health care or visiting the doctor. However, they want this topic to be a larger conversation, whether it be in the workplace or when deciding to go to the doctor.

Sophie Endacott

Nixa, MO

Senior
Health Science (Pre-Professional)

Sp20-98

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Adolescent Friendship Quality: Analyzing the Impact of Internalizing and Externalizing Symptoms, Gender, and Age

Sophie Endacott, Hannah Hannah Holliday, Catherine Everette, Sarah Borowski, Ashley Groh, and Amanda Rose

Friendships play an important role in health and development, especially during adolescence. Studies have found that, among adolescent friendship pairs, there is a positive association between closeness and co-rumination and a positive association between co-rumination and internalizing problems (You and Bellmore, 2011). Additionally, friendships between boys and girls have been found to differ from an early age. Girls typically show connection-oriented goals within friendship pairs while boys value status-oriented goals (Rose and Rudolph, 2006). These differences are also associated with differences in internalizing symptoms (e.g., anxiety, depression) and externalizing symptoms (e.g., fighting, aggression) in boys and girls. While these links are present, research on the connection between friendship quality and internalizing and externalizing symptoms is limited. The purpose of the current study is to examine gender and age differences in internalizing and externalizing symptoms and to examine the associations among internalizing symptoms, externalizing symptoms, and friendship quality. Participants in the study include boy and girl friendship dyads in the eighth, ninth, and tenth grade who participated in a larger study. They completed a series of surveys on Qualtrics. As part of these questionnaires, the Friendship Quality Questionnaire (Rose, 2002) was used to assess qualities of their friendship such as validation and caring, conflict and resolution, affective closeness, emotional closeness, help and guidance, companionship and recreation, and intimate exchange. The Youth Self-Report Form (Achenbach, 1991) assessed internalizing symptoms and externalizing symptoms. Analyses will be conducted to address whether gender and age differences exist in levels of internalizing and externalizing symptoms and whether an association exists between friendship quality and internalizing and externalizing symptoms for boys and girls.

Avery Esquivel

Lincoln, NE

Junior

Early Childhood Education

Sp20-75

Faculty Mentor: Dr. Angie Zapata, Learning, Teaching & Curriculum

Exploring Critical Encounters with First Graders Through Picture Books

Avery Esquivel, Mary Adu-Gyamfi, and Angie Zapata

This qualitative study examines how a first grade teacher explores social justice concepts through picture books with young children during the Language Arts Block. As part of the year-long study, 15 in-class observations were conducted to gather data sources focused on how young children responded and discussed difficult topics concerning identity through illustrations and visual thinking strategies (VTS). Observations of the teacher sharing multimodal literature, interviews with students of varying racial and ethnic histories, socioeconomic status, and ability status were conducted and analyzed to better understand how VTS can scaffold young children's exploration of social justice concepts. The authors conducted a microanalysis of how the teacher and her students entered into social justice literature discussions through VTS.The book of focus, Stella Brings the Family, explored a student's perspective of navigating elementary school/ Mother's Day with two dads. Findings illustrate how the teacher's critical use of VTS and reviewing the student's understanding of identities scaffolded students into discussing difficult topics. Findings also provide evidence for the value of diverse picture books in the classroom. The author concludes by stating the importance of inviting young students to discuss social justice concepts through multimodal literature in order to create a space that values critical conversations to embrace diversity.

Catherine Everett

Nixa, MO

Freshman
Biochemistry; Psychology

Sp20-97

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences;
Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Adolescent Friendship Quality: Analyzing the Impact of Internalizing and Externalizing Symptoms, Gender, and Age

Catherine Everett, Hannah Holladay, Sophie Endacott, Sarah K. Borowski, Ashley M. Groh, and Amanda J. Rose

Friendships play an important role in health and development, especially during adolescence. Studies have found that, among adolescent friendship pairs, there is a positive association between closeness and co-rumination and a positive association between co-rumination and internalizing problems (You and Bellmore, 2011). Additionally, friendships between boys and girls have been found to differ from an early age. Girls typically show connection-oriented goals within friendship pairs while boys value status-oriented goals (Rose and Rudolph, 2006). These differences are also associated with differences in internalizing symptoms (e.g., anxiety, depression) and externalizing symptoms (e.g., fighting, aggression) in boys and girls. While these links are present, research on the connection between friendship quality and internalizing and externalizing symptoms is limited. The purpose of the current study is to examine gender and age differences in internalizing and externalizing symptoms and to examine the associations among internalizing symptoms, externalizing symptoms, and friendship quality. Participants in the study include boy and girl friendship dyads in the eighth, ninth, and tenth grade who participated in a larger study. They completed a series of surveys on Qualtrics. As part of these questionnaires, the Friendship Quality Questionnaire (Rose, 2002) was used to assess qualities of their friendship such as validation and caring, conflict and resolution, affective closeness, emotional closeness, help and guidance, companionship and recreation, and intimate exchange. The Youth Self-Report Form (Achenbach, 1991) assessed internalizing symptoms and externalizing symptoms. Analyses will be conducted to address whether gender and age differences exist in levels of internalizing and externalizing symptoms and whether an association exists between friendship quality and internalizing and externalizing symptoms for boys and girls.

Alicia Flavin
Columbia, MO

Junior
Elementary Education

Sp20-121

Faculty Mentor: Tyler Smith, Educational, School & Counseling Psychology

Effects of Self-Management Interventions on Students Challenging Behaviors

Alicia Flavin and Tyler Smith

Self-management (SM) interventions are a widely-used cognitive behavioral approach used to address disruptive and challenging behaviors of students in school settings. The research underlying the effectiveness of SM interventions suggests their effectiveness at improving both academic and behavioral outcomes for school-aged children (Briesch & Chafouleas, 2009; Mooney et al., 2005). Although previous meta-analyses have indicated benefits for children, less is known about specific SM intervention components that drive intervention effects. This is problematic as many SM interventions involve a combination of self-assessment, self-monitoring, and self-regulation components. Thus, the purpose of our meta-analysis was to: (1) assess the impact of SM intervention on school-aged children's academic and behavioral outcomes and (2) determine what components of SM interventions are related to positive student outcomes. Synthesizing 212 effects across 68 single-subject design studies, preliminary results reveal that SM interventions had a significant positive impact on children's academic (e.g., achievement) and behavioral (e.g., on-task, disruptive behavior) outcomes. Further, key SM intervention components (e.g., self-administering reinforcements, self-determining performance goals) were revealed. These findings indicate the benefits of SM interventions to address student concerns and have implications for tailoring current interventions in order to include effective components

Elizabeth Fletcher

St. Louis, MO

Junior

Biological Sciences; Psychology

Sp20-110

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery

Evaluation of Metabolic Response to Injury and IL-10 Stimulation of Intervertebral Disc Using an ex vivo Rat Tail Model

Elizabeth Fletcher, Emma LePage, and Aaron Stoker

Introduction: This study was designed to assess the pathologic and metabolic changes that occur after injury and IL-10 stimulation to a rat tail whole organ IVD during long term culture. It was hypothesized that there will be a significant decrease in the production of inflammatory and degradative biomarkers in response to stimulation with IL-10 in injured and uninjured IVDs. Further, the production of inflammatory and degradative biomarkers in response to IL-10 stimulation will be significantly higher in injured IVDs compared to uninjured IVDs.

Methods: Tails were collected from 6 skeletally mature Sprague Dawley rats euthanatized for reasons unrelated to this study. IVD Explants (n=24) were created and assigned to either the Injured or Uninjured group with or without IL-10 at 10.0 or 0.0ng/ml. Explants were cultured for 12 days, and media were changed every 3 days and collected for biomarker analysis. On day 12 tissues were processed for cell viability using a resazurin assay.

Results: On day 3 of culture, groups treated with IL-10 produced significantly lower levels of media GAG, PGE2, and MMP Activity. Injured IVDs treated with IL-10 produced significantly higher levels of GROKC, and uninjured samples treated with IL-10 produced significantly lower levels of VEGF.

Discussion: This study uses a whole organ model of disc disease to uncover pathways activated by IL-10 stimulation with and without injury to provide potential diagnostic biomarkers and therapeutic targets for IVD degeneration. The results suggest that IL-10 shows protective and antidegradative effects, and in uninjured samples IL-10 may decrease vascularization.

Brandon Ford

Lebanon, MO

Freshman
Religious Studies

Sp20-23

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Examining the portrayals of race within African American oriented news sites

Brandon Ford, Rachel Henderson, Sadie Lea, Kionte Lewis, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of African Americans in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four African American online media outlets (e.g., The Grio, Blavity, Black Voices, and The Root), with a final sample of $N=600$. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of African Americans in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Margaret Fox
St. Louis, MO

Senior
Psychology

Sp20-12

Faculty Mentor: Dr. Virgina Ramseyer-Winter, School of Social Work

Effects of different types of Instagram posts on college-age women's body image

Margaret Fox and Virginia Ramseyer-Winter

In the past couple of decades, social media has become increasingly more ubiquitous in people's lives. Social media can be understood as a new platform for social comparison and identity formation that is extremely compelling, especially for younger females. Yet it is possible that this constant appraisal of oneself can be related to low self-esteem and even negative body image. If this is the case, then perhaps this trend can be combated with social media posts designed to improve body image.

To test this query, I have conducted an exploratory study of the impact of different types of Instagram posts on young adult women's body image. In particular, I studied three different types of social media posts Perloff identified for improving body image (2014). The types of social media posts are based on three distinct psychological constructs: the knowledge bias, the social norms theory, and the theory of positive psychology. I am particularly interested in knowing which of these three approaches deployed on Instagram, if any, is most effective in improving body image in young adult women. After receiving IRB approval for the study, I began recruiting 200 cisgender women ages 18-25 who report active Instagram use via convenience sampling methods.

Those who met the inclusion criteria were given a survey that measures intensity of Instagram use, body appreciation, and body dissatisfaction. Each participant will then be exposed to two different Instagram posts, one text-based and one image-based, that either violated the knowledge bias, took advantage of the social norms theory, drew on aspects of positive psychology, or served as controls. Finally, participants' body image measures will be assessed once more. Once all the data is collected, I will be conducting an analysis of covariance (ANCOVA) to determine statistical significance of the results.

Katie Frakes

Kearney, MO

Sophomore
Biological Sciences

Sp20-57

Faculty Mentor: Dr. Sara Gable, Nutrition and Exercise Physiology

An Active Counting and Set Labeling Approach to Early Number Learning

Katie Frakes, Gage Crum, Mary Dunleavy, Afiah Mohd Fozi, Tito Plaza, and Sara Gable

Preschoolers' quantitative competencies are predictors of math achievement up to age 15 years and are linked with economic outcomes after high school. This research presents findings from a counting and set-labelling intervention that aimed to move at-risk children more quickly toward cardinal principle knowledge. Cardinal principle knowledge (CPK) is the first conceptual milestone in early mathematical development and acts as a "gatekeeper" to acquisition of later number concepts. Further, attaining cardinal principle knowledge earlier is associated with better future math outcomes. For this project, 58 children in the first year of preschool (average 46 months) were recruited from the CPS Title I Preschool to participate. Children were assessed on their enumeration, verbal counting, cardinal knowledge, numeral recognition, and magnitude comparison abilities. Thirty-six children who scored poorly on the measure of CPK were then randomized, by score, into one of three groups: 1) a sedentary counting and set-labeling intervention; 2) an active counting and set-labeling intervention; or, 3) a no-intervention control group. Children in the first two groups met with an experimenter up to six times over a three- to four-week period. During the first session, children repeated the numeracy assessments and were introduced to the intervention. For sessions two through up to five, children practiced counting and set-labeling. The final session began with a brief intervention session and was followed by post-testing. Children in the no-intervention control group were pre- and post-tested using the same time frame. Data collection is still underway at CPS; analyses will compare children's quantitative competencies across groups and time. Based on past research, we hypothesize that children in the active intervention group will show the largest gains in cardinal principle knowledge when compared to the non-active intervention group and the no-intervention control group.

Katherine Freund
O'Fallon, MO

Senior
Psychology

Sp20-163

Faculty Mentor: Dr. Kristy vanMarle, Psychological Sciences

Children's Categorization of Human Qualities

Katherine Freund and Kristy vanMarle

Three-month-old infants form categories based on perceptual similarity (Quinn & Eimas, 1996), and by age 1, form conceptual categories, grouping items based on deep properties, rather than superficial appearance. Using the sequential-touching (ST) task, Mandler, Bauer, & McDonough (1991) showed that 2-year-olds differentiate global-level categories. In ST, children play with a set of toys for 2-minutes while the experimenter records the order in which they touch the toys. Children demonstrate categorization by touching items from one category (e.g., animals) before touching items from the other category (e.g., vehicles). While many studies have examined global-level categorization, few have explored within category contrasts (e.g., gender, Levy, 1999). Here we ask whether age, gender, and race are equally salient in children's categorization of humans.

Children were randomly assigned to experimental or control groups before participation. Children complete the ST task twice, separated by a brief exposure where the experimenter demonstrates a homogeneous or heterogeneous grouping. For ST, nine dolls (Asian, Black, and White each with an adult-female, adult-male, and gender-neutral infant) are presented for two minutes of undirected play for each ST task where touches are recorded with the exposure task in between.

Data collection is complete (n=27). Chi-square analyses reveal that AGE was the most salient dimension, as children's initial groupings (first three objects touched) were most likely to be homogeneous in age at both pretest ($X^2(3) = 14.33$, $p = .002$, two-tailed) and posttest ($X^2(2) = 13.56$, $p = .001$, two-tailed). Frequencies of grouping along the various dimensions did not vary by subject gender or experimental group (all $X^2s < 5.99$, all $ps > .05$, two-tailed). When given a chance to group along the dimensions of age, gender, or race, children's spontaneous groupings were overwhelmingly based on age, showing that gender and race are not highly salient to children in preschool.

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Matthew Gao
Joplin, MO

Junior
Biological Sciences

Sp20-39

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery

Funding Source: Undergraduate Research Award

Correlations among Pro-Inflammatory, Degradation-Related, and Bone Metabolism Biomarkers Released by Bone obtained from Patients with Knee Osteoarthritis

Matthew Z. Gao, Hayley G. Ockerhausen, Tyge J. Ortega, Muhammad H. Salim, Ashwin Garlaparty, Chantelle C. Bozynski,
James A. Keeney, James L. Cook, and Aaron M. Stoker

INTRODUCTION: Osteoarthritis (OA) is a multifactorial disease often progressing from an initial insult or injury to whole-joint inflammation and degeneration causing pain and dysfunction. The development and progression of OA is highly variable among patients, resulting in significant regional variation in architecture and metabolic responses of affected tissues. This study was designed to determine strength of correlations between the production of pro-inflammatory, degradation-related, and bone metabolism biomarkers of the underlying bone from OA patients undergoing total knee arthroplasty. It was hypothesized that there would be important (moderate ($r=0.4$-0.69) to strong ($r\geq0.7$) and significant ($p<0.05$)) correlations among these assessments of subchondral bone from osteoarthritic knees.

METHODS: With IRB approval, tissues normally discarded during surgery were obtained from OA patients undergoing TKA surgery. Explants (6mm) were created and cultured for 3 days. Day 3 media was assessed for relevant OA biomarkers. Spearman's correlation analyses of the rankings of each biomarker was performed to identify production patterns.

RESULTS: There were numerous strong to moderate correlations within and between biomarkers associated with bone metabolism, degradative metabolism, and inflammatory metabolism.

CONCLUSION: The results of this study suggest that the relationships among the underlying bone metabolic processes in end-stage knee OA are complex and multifaceted.

Ashwin Garlapaty

Eureka, MO

Sophomore
Biological Sciences

Sp20-53

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery

Funding Source: Thompson Laboratory for Regenerative Orthopaedics

Correlations Among Biomechanical Properties, Metabolic, and Histological Characteristics of Articular Cartilage from Osteoarthritic Knees

Ashwin R. Garlapaty, Muhammad H. Salim, Tyge J. Ortega, Hayley G. Ockerhausen, Matthew Z. Gao, Conner B. Schmid, Chantelle C. Bozynski, James A. Keeney, James L. Cook, and Aaron Stoker

Abstract withheld due to proprietary permissions.

Ronel Ghidey

Columbia, MO

Senior

Biological Sciences; Public Health

Sp20-171

Faculty Mentor: Dr. Elizabeth King, Biological Sciences

Funding Source: NIH Initiative for Maximizing Student Diversity (IMSD-EXPRESS)

The role of alternative splicing in fruit fly thermal tolerance

Ronel Ghidey, Patricka Williams-Simon, and Elizabeth King

Thermal tolerance is a quantitative trait influenced by a combination of genetic and environmental factors. It is an essential survival skill in many species, particularly *Drosophila melanogaster* (fruit flies), whose body temperature changes with the ambient temperature. Several studies have characterized thermal tolerance in fruit flies, however, we still know little about the genetic basis of this complex trait. Regulatory changes that alter gene expression are one of the potential genomic changes that could influence an individual's thermal tolerance. As a mode of gene expression modification, alternative splicing is instrumental in diversifying protein expression and forming different isoforms within the genome. We used the Drosophila Synthetic Population Resource (DSPR), a large, multi-parental population of Recombinant Inbred Lines (RILs) consisting of approximately 1,600 RILs, to investigate the role of alternative splicing in thermal tolerance. A previous study in our lab identified 8 QTL influencing thermal tolerance by assaying a total of 741 RILs (~40,000 individual) of flies at 41°C. We first validated these thermal tolerance measurements by assaying a subset of high and middle thermal tolerance RILs at a higher temperature of 43°C to determine the upper thermal limits of the DSPR RILs and whether the assay was replicable. Next, we hypothesized that where alternative splicing occurs within the genome, flies with high thermal tolerance will have similar isoform formation and gene expression in comparison to the low thermal tolerance population. We performed pooled RNAseq on the 7 high thermal tolerance and 7 low thermal tolerance RILs and followed with the "New Tuxedo Package" RNAseq analyzing tool to identify splice variants and isoforms that differ between the high and low thermal tolerance pools. We then linked these results to our QTL mapping results by identifying splice variants that occur within our QTL intervals of interest to identify potential candidate genes. By identifying splice variants within the DSPR, we aim to identify which genes are causal in thermal tolerance and how the diversification of gene expression through alternative splicing affects phenotypic expression.

Kobe Gibson

Memphis, TN

Junior
Architectural Studies

Sp20-26

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Minority News: Examining the portrayals of race within Latinx focused news outlets

Kobe Gibson, Josiah Dycus, Jackson Hale,Julia Gilman, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four Latino online media outlets (e.g., Remezlca, Latina.com, Latino Voices, and El Día News), with a final sample of *N=600*. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of Latinos in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences

Julia Gilman

Willow Springs, IL

Junior
History

Sp20-108

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Minority News: Examining the portrayals of race within Latinx focused news outlets

Julia Gilman, Josiah Dycus, Jackson Hale, Kobe Gibson, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four Latino online media outlets (e.g., Remezlca, Latina.com, Latino Voices, and El Día News), with a final sample of *N=600*. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of Latinos in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Weston Goodwin

Willow Springs, IL

Freshman
Biomedical Engineering

Sp20-138

Faculty Mentor: Dr. Benton Kidd, Museum of Art & Archaeology

Funding Source: ASH Scholars

Realtime Reactions to Suicide and Martyrdom vs. the Visual Record

Weston Goodwin, Nick Childers, Luci Cook, Lauren Greiner, and Benton Kidd

Death is a uniquely personal yet universal experience, one that has long been shared with others through artistic processes. Throughout history and across mediums, artists have further explored the theme of death in a myriad of ways. In our study we use examples of historical art representing suicide and martyrdom to question how the act of viewing might influence the thoughts and feelings of observers. Do controversial modes of death represented in art mitigate feelings of death-anxiety or exacerbate them? Are there connections between a participant´s demographics and their feelings on these subjects? Additionally, we explored how death and sex are often inextricably related, and respondents were asked to gauge erotic overtones in the images. An online study conducted using Amazon's MTurk examined these questions. Individuals (*N = 450*) completed personality and individual difference measures regarding their perceptions of various forms of death, religious faith, violence, and religion in visual art. Participants were shown artwork chosen to stimulate thoughts about suicide, martyrdom, and eroticism as well as neutral control images. The study further examined how viewing artistic expressions of certain modes of death, sometimes with overtones of eroticism, can influence an individual's outlook on mortality. Analyses of the data also informed researchers whether engaging with images led respondents to further reflect about anxieties and other emotions associated with death, and how these might differ between personality types. More broadly, this study provides insight into the role that viewing art can play in helping people cope with mortality.

Madison Green

Warrensburg, MO

Junior

Public Health; Biological Sciences

Sp20-117

Faculty Mentor: Dr Cheryl Rosenfeld, Biomedical Sciences

Funding Source: NIH grant to Dr. Cheryl Rosenfeld

Effects of Maternal Oxycodone Use on Placental Development

Madison Green, Rachel Martin, Jessica Kinkade, Jiude Mao, and Cheryl Rosenfeld

In 2016, prescription opioids were abused by approximately four percent of the United States population (1). Oxycodone is considered at the epicenter of the current public health crisis, as it has and continues to be greatly overprescribed by physicians. Scant information is available on how maternal oxycodone exposure may affect conceptus development, which includes the placenta and fetus. The placenta is the primary communication organ between the mother and fetus that allows for exchange of gases, nutrients, and waste. Proximity of the fetal placenta to the maternal blood in rodents and humans who have a hemochorial form of placentation renders this organ vulnerable to pharmaceutical agents circulating in the mother's bloodstream (2). We thus hypothesized that oxycodone exposure may result in deleterious placental changes offspring. Twelve CF1 mice were exposed daily to 5 mg oxycodone/kg body weight or saline control two weeks prior to breeding until 12.5 days post-coitus. Half of placental tissue was frozen for RNA isolation, and the other half was fixed in 4% paraformaldehyde for histological sectioning and hematoxylin and eosin staining. This method revealed that the percentage of apoptotic trophoblast giant cells, which are the cells in the mouse placenta at the interface with uterine tissue, was significantly increased in the oxycodone exposed group relative to controls (16.5 ± 2.1 vs 4.9 ± 0.7%, respectively; $p<0.01$; n=20 placenta for each group). Preliminary assessments indicate oxycodone exposed mice showed a trend for greater vacuolization within the spongiotrophoblast layer ($p = 0.06$). RNA was isolated from the frozen placental tissues, and RNAseq analysis performed with the NovaSeq 6500 (Illumina). We are currenlty analyzing these data. Our data indicate maternal exposure to oxycodone detrimentally affects the placenta by increasing the number of apoptotic trophoblast giant cells and likely induces other pathological and molecular alterations.

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Melanie Grupka

Lake Villa, IL

Junior

Communication Science and Disorders

Sp20-129

Faculty Mentor: Dr. Nicholas Smith, Speech, Language and Hearing Sciences

Funding Source: Richard Wallace Faculty Incentive Grant from the Mizzou Alumni Association

An Investigation of the Timing of Mother-Child Dialogue in Families in Poverty

Melanie H. Grupka, Katherine A. E. Boley, and Nicholas A. Smith

Children in low-SES families tend to have smaller vocabularies and lower scores on measures of school readiness. Children's language environment is likely an important factor, with children in poverty encountering 30 million fewer words before the age of four than children in more affluent families (Hart & Risley,1995; "30-million-word gap"). Much less is known about the detailed timing of mother-child dialogue, and how these factors may influence language development. In this study we examine video recordings of mother-child dialogue from families who participated in the nationwide evaluation of the Early Head Start (EHS) program. Mother-child interactions were coded at three ages (14, 24, and 36 months) for various temporal measures, such as number of utterances, response latency, duration of utterances, and the number of interruptions. Our previous work identified a correlation between the timing of maternal and child utterances, as well as age-related decreases in response latency (Smith & McMurray, 2018). We extend this work with the EHS database to examine two overarching questions: What maternal predictors correspond to differences in these temporal measures?, and What differences in child language outcomes are predicted by differences in these temporal measures? Some such maternal predictors we will analyze are demographic factors, maternal mental health, and parenting behavior. Some child outcomes we will analyze are behavior, vocabulary, and academic outcome. Our preliminary results suggest that mothers with higher levels of depression have slower or more variable response latencies, and we expect to continue finding other relationships such as this as we analyze the data further.

Jacob Hager

Harviell, MO

Junior

Economics; Mathematics

Sp20-3

Faculty Mentor: Dr. Saku Aura, Economics

Funding Source: A&S Undergraduate Research Mentorship Program

Association Between Social Security Disability Insurance Recipient Rates and State Unemployment

Jacob Hager and Saku Aura

Over the past thirty years, non-elderly SSDI recipient rate has increased by over forty percent, most prevalently in areas that have experienced labor market decline in industry and agriculture. These areas include the Deep South, Appalachia, and even in the University of Missouri's home state along the Missouri-Arkansas border. As the demand for low-skilled labor decreases and the benefits of disability insurance become easier and more profitable to obtain, this situation seems to be a text-book example of the economic moral hazard of insurance. Such a phenomena can have rippling effects on the Social Security system and the US economy as a whole. To study the effects of economic conditions on state SSDI recipiency rates, we compared state unemployment rates to the flow of SSDI recipients in each respective state. We did this using state unemployment rates and the Social Security Administration's Annual Statistical Report on the Social Security Disability Insurance Program from the years 2003 to 2018. We analyzed the data using a multivariable regression model. While our results show a strong correlation between the increased flow of recipients and the adjusted economic performance of each state, more research is required on this subject. The statistical abnormalities in the recipiency flow and the large amount of "noise" in the data displays that while an observable economic event is occurring, more detailed tests and samples should be performed. Unexplained systematic patterns in the data could have been caused by changes in policy such as the passage of the 2010 Patient Protection and Affordable Care Act and the publishing of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) in 2013.

Jack Hale

Warrensburg, MO

Junior

Communication; Romance Languages (Spanish)

Sp20-20

Faculty Mentors: Dr. Christopher Josey, Communication; Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Minority News: Examining the portrayals of race within Latinx focused news outlets

Jack Hale, Josiah Dycus, Julia Gilman, Kobe Gibson, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four Latino online media outlets (e.g., Remezlca, Latina.com, Latino Voices, and El Día News), with a final sample of *N=600*. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of Latinos in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Sarah Hanske

St. Louis, MO

Junior
Psychology

Sp20-4

Faculty Mentor: Dr. Nicole Campione-Barr, Psychological Sciences

Differences in Adolescent Disclosure to Siblings in Intact vs. Non-Intact Families

Sarah Hanske, Yue Guo, and Nicole Campione-Barr

Research (Howe et al. 2000, 2001; Campione-Barr et al. 2015) suggests that sibling disclosure is associated with greater trust within sibling relationships and overall better youth adjustment over time, while adolescents also disclose information across various social-cognitive domains (social domain theory; Turiel, 2002). Also, there is evidence that marital or co-parental relationships can influence sibling relationships. According to Social Learning Theory (Bandura,1977), parental conflict can lead to higher negativity in siblings, while the sibling compensation hypothesis (Myers & Weber, 2004) suggests that siblings can support one another and compensate for poor marital or co-parental relationships. The present study examined differences in domain of emerging adult disclosure to siblings in intact vs. non-intact families.

260 predominantly White and middle-class college-aged first and second born youth participated; 188 had biological parents in intact relationships (i.e. cohabitating and married), and 72 had parents in non-intact relationships (i.e. separated, divorced, widowed, never married and not cohabitating). Emerging adults rated their disclosure to their siblings across 3 social cognitive domains using a previously adapted measure (Campione-Barr et al. 2015; Smetana et al. 2006 personal, α=0.94, prudential, α=.87, and multifaceted items, α=.87).

We conducted a 2 (Target Gender) X 2 (Sibling Gender) X 3 (Domain) X 2 (Family Intactness) X 2 (Target Birth Order) repeated measures ANOVA. Siblings from intact families disclosed more to each other than siblings from non-intact families, $F(1, 240) = 4.05$, $\rho < .05$, $\eta^2 = .02$. A main effect of gender, $F(1, 240) = 9.31$, $\rho < .01$, $\eta^2 = .04$, was qualified by a significant Target Gender X Sibling Gender interaction, $F(1, 240) = 11.46$, $\rho < .01$, $\eta^2 = .05$ and a significant Birth Order X Target Gender X Sibling Gender interaction, $F(1, 240) = 4.81$, $\rho < .05$, $\eta^2 = .02$. Overall, the results reveal greater support for modeling than compensation.

Emily Harrelson
Saint Peters, MO

Sophomore
Biochemistry

Sp20-38

Faculty Mentor: Dr. Charlotte Phillips, Biochemistry

Funding Source: CAFNR On Campus Research Internship

Fiber-type Switching in Osteogenesis Imperfecta Mouse Models

Emily Harrelson, Victoria Gremminger, and Charlotte Phillips

Osteogenesis imperfecta (OI) is an autosomal dominant disease that causes short stature, bone fragility, frequent bone fractures, and muscle weakness. Approximately 85% of OI cases are caused by mutations in type 1 collagen chains (COL1A1 and COL1A2). Our lab uses the osteogenesis imperfecta murine (*oim*) model of OI in mice in which the homozygous oim/oim mice display type III severe OI. Muscle force deficits independent of muscle size have been found in patients and mouse models of OI, showing the inherent nature of muscle weakness in OI. Mitochondrial dysfunction has also been observed in the skeletal muscle of OI mouse models. Because mitochondria supply energy to muscles, we analyzed muscle fiber-types in OI and wild type mice to determine if OI can cause muscle fiber-type switching. Muscle fiber-types include slow-twitch, oxidative, type I fibers; type IIa fibers that use a mix of glycolytic and oxidative phosphorylation; and fast-twitch type IIb fibers that are the most glycolytic. Using immunohistochemical staining of myosin heavy chains, we stained type I type IIa, and type IIb muscle fiber types. In this experiment, it was determined that homozygous *oim/oim* mice had significantly less type I fibers compared to wild type mice and that *oim/oim* mice had significantly more type IIa fibers than wild type mice.

Mollie Harrison
Kirkwood, MO

Junior
Chemical Engineering

Sp20-5

Faculty Mentor: Dr. Bret Ulery, Biomedical, Biological & Chemical Engineering

Funding Source: Discovery Fellowship - Honors College, Cherng Summer Scholars Program, and MTF Biologics

Hydrogen peroxide releasing biomaterials for vascularization in bone tissue regeneration

Mollie J. Harrison, Brittany N. Allen, and Bret D. Ulery

In the United States, 5-10% of bone fractures result in nonunion. Traditional solutions such as autografts and allografts have significant side effects, including donor site morbidity and disease transmission, respectively. Although new regenerative engineering treatments have been developed, their high cost and limited scalability have prevented their widespread clinical adoption. An additional limitation of bone tissue regeneration is inherent tissue complexity as vascular and neural networks must be regenerated in addition to osteoblasts. The Biomodulatory Materials Engineering Laboratory is working to develop a cheaper and more widely applicable option for large volume bone repair using novel biomaterials. This project focuses specifically on using the simple signaling molecule hydrogen peroxide to induce the differentiation of endothelial cells from mesenchymal stem cells for bone tissue vascularization applications.
First, the therapeutic window for the differentiation of mesenchymal stem cells into endothelial cells using hydrogen peroxide was determined by exposing the cells to various concentrations of hydrogen peroxide for one, three, and seven days. Proliferation and differentiation of the cells was determined for each timepoint using DNA/ATP assays and fluorescent microscopy, respectively. A novel hydrogen-peroxide-releasing biomaterial was then synthesized by modifying glutamic acid with hydrogen peroxide to form a peroxy acid (i.e., perglutamic acid).
Future research will focus on leveraging perglutamic acid as a monomer for various degradable polymers (e.e, polyanhydrides, polyesters, polyamides), for which cell studies can be conducted guided by the already established therapeutic window. The effects of these new biomaterials on off-target cells will also be studied. After biomaterials for osteogenesis, angiogenesis, and neurogenesis have each been synthesized, they can be integrated for large volume bone repair through tissue regeneration.

Emma Heinickle

Weldon Spring, MO

Sophomore

Envrionmental Sciences (Atmosphere)

Sp20-67

Faculty Mentor: Dr. Damon Hall, School of Natural Resources

Funding Source: Damon Hall; US Army Corps of Engineers NW Division Planning Assistance to States, Montana Department of Natural Resources and Conservation, The Nature Conservancy-Montana, & The Willett Foundation, Solicitation #W9182F18Q0037 , "Yellowstone River Cultural Inventory Update with Emphasis on Drought and Flood Preparedness," October 2018-Sept 2021

The US Army Corps of Engineers' Working Relationship with the Communities of the Yellowstone River in Bank Stabilization Projects

Emma Heienickle and Damon Hall

Large river systems that exhibit natural flood cycles depend upon collaborative and integrated water resources management. Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act give management authority of navigable waterways of the US to the US Army Corps of Engineers (USACE/Corps). References to the Corps-River Stakeholder relationships were examined using the 2018 interview data from the YRCI. The YRCI's purpose is to document the descriptions, hopes, and concerns of and for the diverse places and communities along the Yellowstone River. Findings show landowners, agriculturalists, and recreationists voice a strong appreciation for the river and care for its continued use. The USACE can learn valuable experience and knowledge of bank stabilization through learning the perceptions of the people. This new understanding will guide the Corps into better managing the river and preparing for future floods and natural disasters.

Rachel Henderson

Atlanta, GA

Freshman
Journalism

Sp20-24

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Examining the portrayals of race within African American oriented news sites

Rachel Henderson, Sadie Lea, Kionte Lewis, Brandon Ford, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of African Americans in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four African American online media outlets (e.g., Black Voices, The Grio, Blavity, and The Root), with a final sample of *N=600*. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of African Americans in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of African Americans audiences.

Tiana Henderson

Chicago, IL

Senior
Psychology

Sp20-85

Faculty Mentor: Dr. Kelli Canada, School of Social Work

The Relationship between Criminal Thinking, Mental Illness and Social Disadvantage

Tiana Henderson and Kelli Canada

Previous research has shown that criminal thinking is one of the main risk factors leading to criminal behavior. Mental illnesses (MI) including substance abuse and social factors increase the chances of crime. A study examined nine social determinants of health (Compton) and found they predispose individuals to poor health outcomes and contributes to the onset and worsening of mental illness. This study examines the relationship between criminogenic thinking and social disadvantage factors and mental illnesses. Previous studies support that there should be a relationship between all three variables.

The current study utilizes secondary data from a larger study. Data was gathered through a structured interview that included a self-report on demographics, mental health and criminogenic thinking. Reports on the individuals' legal history was also gathered and analyzed. In this study, I plan to use a correlation and ANOVA analysis to examine the relationship between criminal thinking and related risk factors of social disadvantage and mental illnesses.

Results showed that there were no significant differences in criminal thinking across sex, education level, race or employment and criminal thinking and age were not significantly associated with one another. In relationship to MI, criminal thinking scores and DSM cross-cutting scores are slightly positively correlated. Looking at environment(housing) in relationship to criminal thinking, individuals who were homeless had a significantly lower criminal thinking score.

The findings from this study are a start to understanding the relationship between criminal thinking, MI, and social disadvantage. Persons with MI are overrepresented in prisons thus understanding what relationships exist between these variables can be used to draw interventions and change polices for marginalized individuals who are constantly put at a disadvantage. In the future, this research can further be developed by examining the role of race considering that African Americans are overrepresented in the criminal justice system.

Miki Hodel
Fenton, MO

Junior
Biological Sciences

Sp20-155

Faculty Mentor: Dr. Azlin Mustapha, Food Systems and Bioengineering

Funding Source: MU Honors College Founders' Memorial Scholars

HRM multiplex real-time PCR detection of Salmonella virulence and ESBL resistance genes in food

Miki Hodel, Rajiv Dhital, and Azlin Mustapha

Salmonella is a gram-negative bacterium comprised of two species and 2,500 serotypes. The World Health Organization estimates that each year, there are 78.8 million cases of non-typhoidal salmonellosis caused by contaminated food and water. Currently, several antibiotics are used to treat salmonellosis. However, due to the overuse of antibiotics in human medicine and animal husbandry, and horizontal transfer of antibiotic resistance genes from closely related enteric bacteria, resistance in *Salmonella* has become an emerging public health concern. Extended spectrum beta lactamase is an enzyme that bacteria use to garner resistance to extended spectrum beta-lactam (ESBL) antibiotics, a last resort antibiotic class with high medical value. In MU's Food Science Program, Dr. Mustapha's research group is developing a technique that uses a high resolution melting (HRM) multiplex real-time (RT)-PCR assay to detect ESBL resistance genes in *Salmonella* from contaminated food. HRM RT-PCR is suitable for virulent ESBL-resistant *Salmonella* detection because results can be obtained faster than is achievable by conventional PCR, multiple target genes can be detected in one assay, and there is a low occurrence of false positive results. The HRM RT-PCR assay in development uses nine different target genes that includes the virulence genes associated with *Salmonella* infections and ESBL resistance genes. The assay is being applied to detect these genes in a variety of food samples that have been associated with foodborne salmonellosis.

Baker Hodges

St. Joseph, MO

Senior
Psychology

Sp20-99

Faculty Mentor: Dr. Jamie Arndt, Psychological Sciences

The sky is falling: the effect of catastrophic news headlines on death thought accessibility

Baker Hodges, Michael Bultmann Peter Helm, Tyler Jimenez, and Jamie Arndt

Main Purpose: In modern society, being bombarded with news headlines is nearly inevitable. From constant advertising on the Internet, to breaking news tweets, to jumbotrons in large cities, much of the news can make it sound like the world is going to end. Terror Management Theory (Greenberg et al., 1986) suggests, to the extent that these headlines threaten one's worldview, they can elicit death-related cognition (DTA; Hayes et al., 2010). The purpose of this study was to determine if exposure to catastrophic news headlines affects DTA and just world beliefs (Lerner, 1980).

Procedure: Study 1 (*N = 299*) pilot tested 50 headlines to determine their degree of perceived catastrophe. Headlines rated as most and least catastrophic were identified for manipulations in Study 2. In this study (*N = 852*), participants were presented 10 headlines. The number of catastrophic headlines (e.g. "Alarming Levels of Plastic in Children's Bodies, German Study Shows") varied by condition, with participants randomly assigned to eight, two, or zero catastrophic headlines as a control condition. Following the manipulation, participants completed measures of DTA, personal belief in a just world (PBJW) and general belief in a just world (GBJW).

Results: Study 2 found that participants exposed to 8 catastrophic headlines reported less GBJW, but not PBJW, compared to the other conditions. Additionally, results revealed a condition by PBJW interaction predicting DTA, such that those with high PBJW reported greater DTA in the 8-catastrophic headline condition compared to the control condition, and those with low PBJW reported greater DTA in the control condition compared to the 8-catastrophic headline condition. These results suggest those with low PBJW have their worldview threatened by not hearing about catastrophic events, and that those with high PBJW have their worldview threatened, as indicated by DTA, by hearing about many catastrophic events. Implications and possible future directions are discussed.

Brooke Hoeferle

Bloomington, IL

Senior
Psychology; English

Sp20-122

Faculty Mentors: Dr. Ashley Groh, Psychological Sciences; Nanxi Xu, Psychological Sciences

Examining the Role of Gender in the Factor Structure of Parenting Behaviors

Brookw Hoeferle, Nanxi Xu, and Ashley Groh

This project examines the role of gender in the factor structure of parenting behaviors within a free play context. Although studies have assessed caregiving behavior using multiple dimensions (e.g., sensitivity, intrusiveness, detachment), few studies focus on how these behaviors are associated and whether such associations vary by gender. In one study comparing maternal and paternal sensitivity toward infants, mothers and fathers were equally sensitive across different caregiving contexts (Branger et al., 2019). However, there are two important limitations. First, the focus was only on parental sensitivity. Second, the researchers did not examine parenting behaviors using formal statistical procedure. This study addresses these limitations by examining mothers' and fathers' parenting behaviors using multiple dimensions in a latent structural model.

The sample for this study comprises 142 mothers, 127 fathers, and their 6-month-old infants. Mother-child and father-child dyads were observed separately during free play (i.e., the dyad plays without toys). The free play sessions were videotaped and then coded using scales adapted from the NICHD Study of Early Child Care (Frosch & Owen, 2016). Parenting behaviors included in analyses are sensitivity (i.e., prompt, appropriate responding), intrusiveness (i.e., parent imposes own agenda), detachment (i.e., lack of emotional connection), positive regard (i.e., warmth and affection), and negative regard (i.e., physical and verbal harshness).

Results of structural equation modeling indicate no gender differences for the underlying factor structure of parenting behaviors. Findings from the current study indicates parental caregiving behaviors are represented by two factors: emotional disengagement and negative intrusiveness, converging with and extending the previous studies (Mills-Koonce et al., 2009; Xu, 2018). Findings from the study provide evidence supporting the use of formal models (e.g., structural equation modeling) that capture underlying variation in caregiving behaviors and consider the role of gender in caregiving investigations of parent-child relationships and parenting outcomes.

Kennedy Hoke

East Moline, IL

Junior
Early Childhood Education

Sp20-29

Faculty Mentor: Dr. Shannon Holmes, Educational, School & Counseling Psychology

A Systematic Review of Treatment Fidelity for Behavioral Interventions in School

Kennedy Hoke, Courtney Botkins, and Shannon Holmes

Some estimates suggest that over 4 million school-age youth in the United States suffer from behavior problems that impair their academic, emotional,and social functioning. There has been an increased effort to implement evidence-based behavior interventions in schools. Treatment fidelity is crucial to understanding how an intervention was implemented and determining whether the intervention is effective. Previous reviews of treatment fidelity have revealed that most studies fail to report fidelity data. The purpose of this study was to systematically review treatment fidelity data reported in experimental studies of school-based behavioral interventions between 2008 and 2019.Preliminary results of the review will be presented along with implication to inform future research and practice.

Hannah Holladay

Overland Park, KS

Senior

Journalism (Strategic Communication); Psychology

Sp20-43

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Adolescent Friendship Quality: Analyzing the Impact of Internalizing and Externalizing Symptoms, Gender, and Age

Hannah Holladay, Sophie Endacott, Catherine Everett, Sarah K. Borowski, Amanda J. Rose, and Ashley M. Groh

Friendships play an important role in health and development, especially during adolescence. Studies have found that, among adolescent friendship pairs, there is a positive association between closeness and co-rumination and a positive association between co-rumination and internalizing problems (You and Bellmore, 2011). Additionally, friendships between boys and girls have been found to differ from an early age. Girls typically show connection-oriented goals within friendship pairs while boys value status-oriented goals (Rose and Rudolph, 2006). These differences are also associated with differences in internalizing symptoms (e.g., anxiety, depression) and externalizing symptoms (e.g., fighting, aggression) in boys and girls. While these links are present, research on the connection between friendship quality and internalizing and externalizing symptoms is limited. The purpose of the current study is to examine gender and age differences in internalizing and externalizing symptoms and to examine the associations among internalizing symptoms, externalizing symptoms, and friendship quality. Participants in the study include boy and girl friendship dyads in the eighth, ninth, and tenth grade who participated in a larger study. They completed a series of surveys on Qualtrics. As part of these questionnaires, the Friendship Quality Questionnaire (Rose, 2002) was used to assess qualities of their friendship such as validation and caring, conflict and resolution, affective closeness, emotional closeness, help and guidance, companionship and recreation, and intimate exchange. The Youth Self-Report Form (Achenbach, 1991) assessed internalizing symptoms and externalizing symptoms. Analyses will be conducted to address whether gender and age differences exist in levels of internalizing and externalizing symptoms and whether an association exists between friendship quality and internalizing and externalizing symptoms for boys and girls.

Taoru Huang

Yangquan, China

Senior
Journalism

Sp20-173

Faculty Mentor: Dr. Amanda Rose, Psychological Sciences

Vagal Tone and Perceived Support within Adolescent Friendships: Considering the Role of Interaction Type and Gender

Taoru Huang, Wenting Sun, Sarah Borowski, and Amanda Rose

Vagal tone (i.e., parasympathetic regulation of cardiac activity via the vagus nerve) is an important factor for emotional self-regulation (Beauchaine, 2015) and functioning in close relationships (Porges, 2019). It is frequently measured using respiratory sinus arrhythmia (RSA) which indexes high-frequency heart rate variability over the respiration cycle. RSA has been linked with youths' peer group functioning, including positive coping with victimization (Erath & Tu, 2014) and boy's prosocial behavior (Eisenberg et al., 1995, 1996). However, RSA has not been considered in relation to adolescent friendships (Murry-Close, 2012), which are central sources of emotional support during adolescence (Furman & Rose, 2015). The current study examined relations between adolescents' resting RSA activity and their perceived support during friendship interactions. We hypothesize that higher levels of RSA will be associated with higher levels of perceived support. We also consider whether the association between resting RSA activity and perceived support depends on the context in which support is given (i.e., plan a party/positive context, talking about a problem/negative context), and gender. To address hypotheses, 146 participants who were 8th, 9th, and 10th grade came in the lab with a same-gender friend. Three disposable electrodes were applied to participants' torsos to monitor electrocardiogram (ECG) data, and a monitor respiration belt was applied around their diaphragms. Resting RSA activity was measured while adolescents sat quietly for 3 minutes in separate rooms. Friends participated in two interaction tasks: (1) talk about a personal problem for 16 minutes and (2) planning a party for 7 minutes. After each task, adolescents responded 10 items assessing perceived friendship support (e.g., "My friend accepts me no matter what I do") on a 5-point scale ranging from 1 (not at all true) to 5 (really true).

Alexis Hunter

Flossmoor, IL

Junior

Secondary Education (Language Arts)

Sp20-136

Faculty Mentor: Dr. Ashley Woodson, Learning Teaching & Curriculum

Memes as Digital Graffiti: Working to Disrupt the Literary Canon

Alexis Hunter and Ashley Woodson

My research is how memes can be utilized in classroom spaces; particularly in high school. When connected to rich histories of graffiti and political cartooning in Black communities, the creation of memes becomes a process of empowerment, and the sharing of memes becomes a way to "tag", disrupt and transform consciousness on social issues. This research offers important historical grounding for educators who hope to make connections between contemporary online activism and art foundations. As a Secondary Language Arts Education major this work is particularly important because it disrupts the literary cannon and provide more relevant texts for students to engage with. Non-traditional texts are particularly effective when paired with canonical texts because it allows for students to make connections. Also, these texts are more inclusive for students than texts from the literacy canon.

Delaney Jackson

Lee's Summit, MO

Junior
Elementary Education

Sp20-104

Faculty Mentor: Dr. Xinhao Xu, School of Information Science & Learning Technologies

VR02 Virtual Reality Experience

Delaney Jackson, Hao He, Jhon Bueno Vesga, Shangman Li, Fan Yu, and Amanda Stafford

Abstract withheld due to proprietary permissions.

Taylor Jancetic
Chicago, IL

Senior
Psychology

Sp20-159

Faculty Mentor: Dr. Steven Hackley, Psychological Sciences

Intrusion into Awareness of Words Unconsciously Registered in Visual Working Memory

Taylor Jancetic, Fernando Valle-Inclan, Nelson Cowan, Amy Underwood Barton, Sabrina Bhangal, and Steven Hackley

Evaluation and reaction of a scene means filtering through information to allow working memory (WM) processing for the perceived most important items. However, there is little known about (WM) processing in relation to unconscious states. In the past, unconsciously perceived shapes showed significant interference with visual working memory (VWM) systems (Underwood, 2018) but replication has not been seen. In this study, we seek to address possible impacts of language related unconscious loads on VWM. Language has previously been proven to be a fit model for measuring unconscious processing variables. It is suggested that mechanisms which are involved in working memory, such as reading comprehension, are highly active in unconscious states (Soto, Silvanto 2014). Thus, the unconscious to conscious spectrum of activation and higher-level cognitive processing seem to imply that language is a worthy indicator of unconscious states on the VWM threshold.

Our process includes creating binocular rivalry using a mirror stereoscope to produce conscious and unconscious visual letters to the participant. In each trial, the computer display will simultaneously show visible letters on one half of the screen and a distraction image, known as continuous flash suppression (CFS), overlaying invisible letters on the other half. In addition, some cases with the unconscious letters will spell a word to create higher cognitive interpretation. After the letters are presented, the participant will be asked to report change in target items to ensure working memory or accuracy, followed by an awareness report and feedback of recall performance.

We theorize that unconsciously perceived words will produce the most load and/or will have the highest rate of awareness intrusion in VWM compared to non-significant letter patterns. These findings would not only supply further evidence for previous unconscious working memory projects, but it would also give rise to better understanding perceptual experience of social interaction.

Alexis Jenkins
O'Fallon, MO

Senior
Psychology

Sp20-34

Faculty Mentor: Dr. Laura King, Psychological Sciences

Do Attractive People Live More Meaningful Lives?

Alexis T. Jenkins, Christopher A. Sanders, Jake Womick, and Laura A. King

Purpose:
The main purpose of this research is deciphering whether physical attractiveness predicts meaning in life (MIL). Previous research suggests that attractive people attain a smoother path through life than unattractive people. Those seen as attractive are more likely to be successful in the workplace and earn more money (Hosada et al., 2003). They are also more likely to have higher well-being and are less susceptible to depression (Gupta et al., 2015).

Procedure:
Over the course of three studies, a collective 1,235 participants provided ratings of self-reported and perceived levels of MIL and attractiveness. In Study 1, student participants were asked to respond to questions regarding their own attractiveness, MIL, and other relevant measures. In Study 2, online participants were prompted to rate not only their own levels of attractiveness and MIL, but were also asked to rate the levels of MIL and attractiveness of people presented to them in photographs. In Study 3, participants responded to numerous self-reported measures before taking a photograph of them self. The attractiveness of these photographs was then rated by independent coders.

Results and Conclusion:
Analysis of Studies 1 and 2 demonstrated that people who believe that they are attractive rate their lives as more meaningful than people who do not ($r=.14$, $p<.001$). Furthermore, people will judge another individual's MIL based on how attractive that individual is thought to be ($r=.42$, $p<.001$). In Study 3, we predict a positive correlation between other-rated attractiveness and self-reported MIL will emerge. While one might expect that MIL is too deep of a construct to be reliant on something so shallow as physical attractiveness, these findings converge on the notion that one's appearance does, in fact, relate to how meaningful they find life to be.

Tessa Jennings

Ashland, MO

Sophomore
Plant Sciences

Sp20-90

Faculty Mentor: Dr. Antje Heese, Biochemistry

Funding Source: CAFNR On Campus Research Internship

Delineating day length-induced immune responses in clathrin-coated vesicle mutants

Tessa Jennings, Kelly Mason, Nga Nguyen, Alex Clarke, and Antje Heese

Abstract withheld due to proprietary permissions.

Yuejiao Jiang

Hunan, China

Senior

Psychology; Journalism(Radio Television)

Sp20-90

Faculty Mentor: Dr. Yuyan Luo, Psychological Sciences

Three-month-old infants' understanding of a human agent's preference

Yuejiao Jiang, You-jung Choi, and Yuyan Luo

Understanding people's preferences is important for interpreting and predicting their behavior. A preference is defined as a dispositional state that helps explain why an individual chooses one object over another option. There has been extensive evidence that infants attempt to make sense of agents' actions by referring to their preferences (Baillargeon, Scott, & Bian, 2016; Baillargeon et al., 2015). The present research wants to present whether infants could use both choice information and effort information to attribute preferences to agents. Infants' sensitivity to agents' choice (Choi et al., 2018; Luo, 2011; Sommerville, Woodward, & Needham, 2005) or the efficiency of their actions (Liu, Brooks, & Spelke, in press; Skerry, Carey, & Spelke, 2013) has been demonstrated with infants as young as three months of age.

Rebecca Johnson

O'Fallon, IL

Senior
Political Science

Sp20-101

Faculty Mentor: Dr. William T. Horner, Political Science; Dr. Stephen Graves, Black Studies

ONE NATION, UNDER CONTROL: Analyzing the Electoral College's Impact on Vote Equality and Representation Today

Rebecca Johnson, Stephen Graves, and William T. Horner

In the United States, American citizens elect their President indirectly through the Electoral College. Within this electoral system, nearly every territory allocates all their electoral votes to the winning candidate and none to the other candidates, despite the margin of success. This vote allocation strategy, commonly known as the "winner-take-all system," was adopted in the early 19th century in efforts to maximize each territory's influence. Despite this, there is little to no prior research on its effectiveness and implications for American people. Therefore, this report analyzes the 2016 Presidential General Election data to calculate the system's overall performance score today. Each territory's score is determined by four separate calculations. The first two, concerned with vote weight, quantify each territory's relative influence according to its number of electoral votes and citizens. The last two, pertaining to vote representation, calculate how accurately the preferences of each territory's citizens were allocated by the Electoral College in 2016. Without this comprehensive and critical analysis, it is impossible to determine the political equality and representation produced by the electoral college today. Thus, this contemporary analysis enables readers to judge the democratic health of the nation's voting procedures today.

Rucsanda Juncu

Columbia, MO

Junior
Biochemistry

Sp20-90

Faculty Mentor: Dr. Benjamin Spears, Plant Sciences

Funding Source: BioInformatics in Plant Sciences (BIPS)

Using High-throughput Phenotyping to Characterize the srfr1 Arabidopsis Mutant

Rucsanda Juncu, Madison Creach, Benjamin Spears, and Walter Gassmann

Abstract withheld due to proprietary permissions.

Annie Jurgensmeyer
Overland Park, KS

Junior
Elementary Education

Sp20-87

Faculty Mentor: Dr. Chad Rose, Special Education

Improving Social Skills and Communication to Improve Academic Self-Efficacy among Youth

Annie Jurgensmeyer, Gracie Kempen, and Chad Rose

Social and communication skills are a critical component of student success. Students who have social and communication skill deficits often report less competence with academic tasks and lower levels of academic self-efficacy. Therefore, it is important to implement programming that will address these deficits to improve academic achievement and social functioning. The purpose of this project was to implement a 10-week social and emotional learning program for youth in grades K-5 that have been identified with social and communication skill deficits to improve the students' self-efficacy in academics and teachers' perceptions of the students' academic competence. Overall, this project was designed to support the individual needs of students who are struggling with social and communication skill deficits. These deficits are related to detrimental short- and long-term outcomes, including problems with academic achievement, self-efficacy, and competence. In this project, approximately 500 youth in grades K-12, who were identified by their teachers or school officials as needing additional supports, received 10 weeks of social and communication skill instruction via a web-based intervention that involved webisodes related to social interactions, social and communication skill acquisition, and recognizing, reporting, and responding to bullying incidents. Results of this project demonstrated the utility of implementing a social and emotional learning program to improve social and communication skill acquisition. Based on a repeated measures multivariate analysis of variance (MANOVA), youth reported increased levels of academic self-competence, while their teachers reported increased academic competence. Overall, this project demonstrated that implementing a 10-week social and emotional learning curriculum could improve social and communication skill acquisition for a targeted subset of youth, while improving academic self-efficacy and competence. Based on the results of this project, it is recommended that schools consider implementing a targeted social and emotional learning curriculum to improve student outcomes and well-being.

Sarabjit Kaur
Apple Valley, CA

Senior
Animal Sciences

Sp20-112

Faculty Mentor: Dr. Cheryl Rosenfeld, Biomedical Sciences

Funding Source: NIH grant to Dr. Cheryl Rosenfeld

Bisphenol A and Genistein-Induced Changes on miRNA Profiles and Associated Behavioral Changes in California Mice (Peromyscus californicus)

Sarabjit Kaur and Cheryl S. Rosenfeld

Endocrine disruptors, such as bisphenol A (BPA) and genistein, mimic estrogen and interfere with estrogen pathways in both males and females. BPA is used worldwide in the production of common household items, especially for food storage. Because BPA can leach from such containers, individuals are often unknowingly consuming this chemical. Genistein is a weak phytoestrogen found in soy and soy-based products. BPA and genistein can disrupt normal steroid and non-steroid receptor signaling pathways in the brain and other organs. Such chemicals may also induce epigenetic changes that alter gene and/or protein expression without changing the DNA structure. miRNA can bind to RNA and destroy them before RNA is transcribed into a protein. Little is known how BPA and genistein may affect neural miRNA profiles, although such chemicals affect these biomolecules in other tissues.

We hypothesized thus that developmental exposure to BPA and genistein alter the miRNA profiles in the hypothalamic region of the brain, and these molecular changes are associated with behavioral disruptions caused by such endocrine disrupting chemicals. Accordingly, we exposed California mice (*Peromyscus californicus*) females for 2 weeks prior to conception and throughout lactation to low dose BPA, high dose BPA, genistein, BPA+genistein, or phytoestrogen-free control diet. Behaviors that were tested and currently being analyzed include cognitive, socio-communication, and anxiety-like behaviors using Barnes maze, Crawley's sociability test, ultrasonic vocalizations, and elevated plus maze. We isolated hypothalamic miRNA for high throughput sequencing, which is currently ongoing.

Javier Kelly-Cuenca

St. Louis, MO

Sophomore
Biochemistry: Psychology

Sp20-135

Faculty Mentor: Dr. Jamie Arndt, Psychological Sciences

Funding Source: ASH Scholars

The Art of Death: The Effects of Viewing Artistic Paintings of Death on Satisfaction with Life

Javier Kelly-Cuenca, Cassie Draudt, Jarrod Russo, Peter Helm, and Jamie Arndt

Mortality related themes have been the subject of art for thousands of years. Death has been represented both as positive and negative, as an end and as a beginning, even as a personified being. A prominent theory in psychology, Terror Management Theory (TMT; Greenberg et al., 1986), suggests awareness of one's inevitable death is a driving force behind a wide range of human behavior. Studies (Routledge et al., 2010) have found, for example, that reminding individuals of their mortality can decrease people's satisfaction with life (SWL). Some research has used graphic imagery to activate death-related cognitions and elicit defensive reactions. However, it remains untested whether the emotional content of death-related imagery – specifically as presented in artistic paintings - differentially influences people's psychological reactions. To assess this question, we conducted a pilot study, (*N = 836*) in which we selected 225 paintings that portrayed death as relatively positive or negative. Participants evaluated these paintings on various dimensions including how much they evoked thoughts of death as well as positive and negative emotions. We selected paintings that equally evoked thoughts of death but differed in their emotional content. In a second study (*N = 513*) participants were randomly assigned to one of four conditions: viewing paintings portraying death with negative emotions, paintings portraying death with mixed emotions (both positive and negative), writing about the thoughts and emotion evoked by death, and a control condition. Participants then completed a measure of SWL and demographic questionnaires. Results indicate that paintings portraying death with mixed emotions led to greater SWL than did the other conditions. This effect was moderated by participant education, such that death paintings containing mixed emotions increased SWL primarily among those with less formal education. Other effects, implications, and future directions are discussed.

Grace Kempen

St. Louis, MO

Junior
Elementary Education

Sp20-92

Faculty Mentor: Dr. Chad Rose, Special Education

Improving Social Skills and Communication to Improve Academic Self Efficacy Among Youth

Grace Kempen, Annie Jurgensmeyer, and Chad Rose

Social and communication skills are a critical component of student success. Students who have social and communication skill deficits often report less competence with academic tasks and lower levels of academic self-efficacy. Therefore, it is important to implement programming that will address these deficits to improve academic achievement and social functioning. The purpose of this project was to implement a 10-week social and emotional learning skill intervention for youth in grades k-5 that have been identified with social and communication skill deficits to improve the students' self-efficacy in academics and teachers' perceptions of academic competence. Overall, this project was designed to support the individual needs of students who are struggling with social and communication skill deficits. These deficits are related to detrimental short- and long-term outcomes including programs with academic achievement, self-efficacy and confidence. In this project, approximately 500 youth in grades K-12, who were identified by their teachers or school officials as needing additional supports, received 10 weeks of social and communication skill instruction via a web-based intervention that involved webisodes related to social interactions, social and communication skill acquisition, and recognizing, reporting and responding to bullying incidents. Results of this project demonstrated the utility of implementing a social and emotional learning program to improve social and communication skill acquisition. Based on a repeated measure multivariate analysis of variance (MANOVA), youth reported increased levels of academic self-competence, while their teachers reported increased academic competence. Overall, this project demonstrated that implementing a 10-week social and emotional learning curriculum could improve social and communication skill acquisition for a targeted subset youth, while improving academic self-efficacy and confidence. Based on the results of this project, it is recommended that schools consider implementing a targeted social and emotional learning curriculum to improve student outcomes and well-being.

Madelyne Kennedy
Liberty, MO

Senior
Biochemistry

Sp20-157

Faculty Mentors: Dr. Doug Bowles, Biomedical Sciences; Dr. Darla Tharp, Biomedical Sciences

Funding Source: Life Science Undergraduate Research Opportunity Program (LSUROP)

Regulatory effects of KCa3.1 on Pro Inflammatory Macrophage Gene Expression

Madelyne Kennedy, Darla Tharp, and Doug Bowles

The intermediate conductance Ca2+-activated K+ channel (KCa3.1), encoded by KCNN4, is present in coronary smooth muscle cells as well as macrophages and has been shown to contribute to the development of atherosclerosis through its various signaling roles. Our objective was to study the effects of KCa3.1 on commonly expressed proinflammatory M1 macrophage genes using male apolipoprotein E knockout (Apoe-/-) and Apoe-/-/KCNN4-/- double knockout (dKO) mice. We hypothesized that knock out of KCa3.1 would inhibit macrophage shift to the M1 phenotype as evidenced by reduced inflammatory markers. Bone marrow derived macrophages (BMDM) were harvested from the femurs of male mice and cultured 7-10 days. BMDM cells were then treated with lipopolysaccharide (LPS, 100 ng/ml, proinflammatory stimulant), TRAM-34 (100 nM, selective KCa3.1 inhibitor), or LPS+TRAM-34 for 48 hours. BMDM cells were harvested, RNA isolated, and first-strand cDNA synthesized. KCNN4, IL-1β, and IL-6 mRNA expressions were quantified using Real-Time PCR (RT-PCR). KCNN4 expression was used to confirm knockout in dKO mice. IL-6 and IL-1β, which are highly expressed in proinflammatory macrophages, were used to indicate macrophage type after treatment. In all treatment groups relative KCNN4 expression was reduced (0.07 +/- 0.01) in dKO mice compared to Apoe-/- (1.00 +/- 0.17). With no LPS treatment there is very little expression of IL-6 or IL-1β in both groups. When treated with LPS, IL-6 expression increased 6.93 (+/- 0.38) fold in Apoe mice and 3.29 (+/- 0.41) fold in DKO mice compared to control. With LPS treatment, IL-1β increased 175.73 (+/- 53.96) fold in Apoe mice and 135.95 (+/- 49.12) fold in DKO mice. TRAM-34 did not inhibit the LPS-induced increase in IL-6 expression in either group (8.77 +/- 1.75 for Apoe-/- and 4.35 +/- 0.87 for dKO), nor did it affect IL-1β expression (283.49 +/- 65.02 for Apoe-/- and 199.00 +/- 54.10 for dKO). TRAM-34 alone was similar to control for IL-6 (0.81 +/- 0.32 for Apoe-/- and 0.98 +/- 0.8 for dKO) and IL-1β (1.16 +/- 0.43 for Apoe-/- and 0.46 +/- 0.17 for dKO). Based on these data we accepted the null hypothesis, neither genetic knockout of KCa3.1 nor inhibition by TRAM-34 prevented the LPS-induced macrophage shift to the M1 phenotype.

Hugh Key
Gladstone, MO

Senior
Biological Sciences

Sp20-145

Faculty Mentor: Dr. Rebecca North, School of Natural Resources

Funding Source: CAFNR On Campus Research Internship

The Relationship Between Aerators and Microcystin: A Comparison Between Two Ponds

Hugh L. Key and Rebecca L. North

Abstract withheld due to proprietary permissions.

Austin Kimes

Collierville, TN

Senior
Biological Engineering

Sp20-178

Faculty Mentor: Dr. Bret Ulery, Biomedical, Biological & Chemical Engineering

Sterilization of Complex Hydrogels for Orthopedic Surgeries

Austin Kimes, Blake Darkow, Yisheng Sun, Caixia Wan, and Bret Ulery

Musculoskeletal diseases are the second leading cause of disability globally and the leading cause in the United States for people over 50 years of age. One of the current gold standards for orthopedic surgical materials is poly(methyl methacrylate) (PMMA), which has a significantly higher compressive strength than native bone and does not facilitate tissue regeneration. Degradable bioactive materials are a desirable alternative to promote native bone regeneration which will help decrease the need for secondary surgeries. Our lab has developed a complex hydrogel that incorporates osteoinductive calcium (Ca^{2+}) and phosphate (Pi) ionic signaling molecules to help promote bone regeneration. Materials-associated local ion delivery has been found to facilitate mesenchymal stem cell (MSC) osteoblastic differentiation while providing mechanical stability closer to native bone tissue than PMMA. In order to implant these hydrogels *in vivo*, a safe sterilization procedure must be established. Using autoclaved chitosan and sterile filtered hydrogel cross-linking solution, complex hydrogels were created and evaluated by mechanical testing (uniaxial compression and swelling assessment). Mechanical characteristics were not significantly altered with sterilization. With the mechanical characteristics unaltered, the hydrogel sterilization can proceed to a cell study to determine efficacy of sterilization. After cell studies, the complex hydrogels can move forward into animal models for immunology/toxicity studies and surgical experiments and eventually utilized in human medicine to promote a faster and stronger bone regeneration than currently available options.

Kiana King
Bloomington, IL

Senior
Psychology

Sp20-66

Faculty Mentor: Dr. Michael Williams, Educational Leadership & Policy Analysis; Dr. Nicole Campion-Barr, Psychological Sciences

Exploring Mentorship, Sense of Belonging, Non-discriminatory Campus Climates and Leadership Self-Efficacy for Black Women Collegians

Kiana King and Michael S. Williams

Main Purpose: Although there is an abundance of research about mentoring in higher education, there is a lack of studies focusing on leadership outcomes which arise from these mentoring relationships (Campbell, Smith, Dugan, & Komives, 2012). Limited research has focused on the leadership experiences of African American women specifically in collegiate spaces (Hague & Okpala, 2017). This study explores the influence of mentorship, belonging, and perceptions of a non-discriminatory campus climate on the leadership self-efficacy of Black women college students.

Procedure: Participants for this study were drawn from the 2015 national administration of the Multi-Institutional Study of Leadership (MSL). Given the purposes of the current investigation, only responses from the 2,850 black female participants were analyzed. Scales examining sense of belonging climate, non-discriminatory campus climate, mentorship, and leadership self-efficacy were utilized.

Results: Hierarchical multiple regression techniques will be used to explore the influence of mentorship, sense of belonging, and non-discriminatory campus climate on leadership self-efficacy measures. We expect to see positive and statistically significant associations between mentoring, sense of belonging, and non-discriminatory campus climate—and the dependent variable, leadership self-efficacy. Research on mentorship and leadership in college students suggests that good quality mentorship has a positive influence on leadership outcomes (Campbell, Smith, Dugan, & Komives, 2012). Therefore, we also predict that findings will reveal significance in the moderating effect of mentorship, such that the mere presence of a caring mentor will offset negative ratings of non-discriminatory campus climate and sense of belonging. This should result in a positive association between these variables and leadership efficacy when a mentor is present in the student's lives.

Conclusions and Implications: Results may help to establish a hierarchy of importance among these variables in connection to leadership self-efficacy. This investigation will also extend our knowledge base regarding what else may be necessary to support Black women collegians.

Naomi Klinge
Bellevue, WA

Senior
Political Science; Journalism

Sp20-125

Faculty Mentor: Dr. William T. Horner, Political Science

Sanctuary Policies in Local Jurisdictions: Decision Making in Law Enforcement

Naomi Klinge and William Horner

The term sanctuary has developed through the years, starting as a religious movement to protect refugees and eventually applying to policies jurisdictions enact that protect immigrants. During the 2016 presidential election, the topic of immigration and sanctuary policies re-entered the national spotlight during debates, dividing local policy makers on the best practices for protecting their communities. Since then, President Donald Trump's presidency has been known for the mass use of social media to call out cities for policy his administration disagrees with.

But there is no legal definition of a "sanctuary" jurisdiction. Several nongovernmental organizations have made lists and maps of counties, cities and states that have enacted what they consider sanctuary jurisdictions, but leaders in some of those jurisdictions have fought to have their names removed. While the Center for Immigration Studies named five Kansas counties as sanctuary jurisdictions, three of them have since been removed from the list. Local media sources have cited some of these sheriffs specifically saying their jurisdictions cooperate fully with the Immigration and Customs Enforcement agency, and that they do not consider their county a sanctuary jurisdiction. One of these sheriffs comes from a county with immigrants making up over 20 percent of its population.

For this reason, this research looks into the decisions sheriffs like these make in order to most effectively protect their communities. Through surveys and interviews with sheriffs and police chiefs, this research examines how the needs of the community and national political discussion about immigration and sanctuary policies influence the decision making of local law enforcement agencies in regards to policies that could be considered "sanctuary."

Leo Koenigsfeld

Bonnots Mill, MO

Sophomore
Biochemistry; Plant Sciences

Sp20-59

Faculty Mentor: Dr. Paula McSteen, Biological Sciences

Funding Source: Discovery Fellowship - Honors College

Fine Mapping and Characterization of the tassel-less4 Mutant in Maize

Leo Koenigsfeld, Janlo Robil, Mika Nevo, Dennis Zhu, and Paula McSteen

Tassel-less4 (Tls4) is a mutant in *Zea mays* (maize) which is characterized by its deficiencies in inflorescence resulting in a smaller tassel, the male reproductive structure in maize. The *tls4* mutant is also characterized by its reduced plant height and narrow leaves. Both fine mapping and bioinformatic methods have been used to locate the causative gene for the tls4 phenotype. Through the utilization of bulked segregant analysis (BSA) and next generation sequencing (NGS) the causative gene was found to be on the long arm of chromosome 4. Fine mapping was then performed using publicly available markers. After exhausting the publicly available markers, new simple sequence repeat (SSR) and derived cleaved polymorphic sequence (dCAPS) markers were created by utilizing differences in the B73 and MO17 maize backgrounds. The utilization of these techniques has narrowed the possible location for *tls4*'s gene to a 200kbp region containing 6 remaining genes. The remaining candidate genes include genes involved in endocytosis and protein folding. The tls4 phenotype is characteristic of mutants containing defects in the plant growth hormone auxin. Auxin is involved in the regulation of plant growth and differentiation. One specific function of auxin is the control of organ formation. By studying tls4 a more complete picture of how auxin functions in plants can be produced and utilized to increase future agricultural productivity.

Fatimah Krgo

Columbia, MO

Senior
Digital Storytelling

Sp20-73

Faculty Mentor: Katina Bitsicas, Digital Storytelling

Funding Source: ASH Scholars

Utilizing Virtual Reality and Video Installation to Explore Emotional Responses to Death and Dying

Fatimah Krgo, Abby Blenk, Cate Willis, Peter Helm, and Katina Bitsicas

Virtual Reality (VR) has been used in recent research on empathy creation for caregivers to experience what it is like during the final stages of their loved one's lives. California-based Embodied Labs, created a VR experience to help nurses and caregivers, empathize with patients at the end of their lives. The ASH Art of Death Digital Storytelling Research Team utilizes these tools to create an experience for viewers to move through the final stages of death and dying.

The In-Between is an interactive multimedia experience composed of two parts: A projected and VR video. The three scenes are a hospital bed, a burial, and waking to an afterlife, meant to represent the different stages of death. The team set out to create open-ended imagery that would leave room for interpretation from the viewer. Filmed from the perspective of the viewer, participants felt like they were in that environment and experiencing this process themselves.

Participants (N=36) viewed the projection as a group with the video filling the room, while the virtual reality video was experienced individually. The majority of participants (80.56%) felt the VR experience led them to reflect on mortality more than the projected video. The majority of participants (63.89%) also felt a greater than average sense of peace, whereas a minority (16.67%) of participants felt a greater than average sense of anxiety.

The data is a preliminary indication of what to study further: The experiential aspect of the study limited participants in the time allowed for data collection, so data is not a representative sample. Results indicate how the level of immersion in a death experience affects the thoughts and feelings of participants. Giving viewers the opportunity to conceptualize their own death could create an accepting mentality around dying and encourage open conversation.

Devesh Kumar

Columbia, MO

Senior
Biochemistry

Sp20-60

Faculty Mentor: Dr. Charles Borduin, Psychological Sciences

Secondary Benefits of Family-Based Treatments for Child Mental Health Problems: A Multilevel Meta-Analysis

Devesh Kumar, Kaitlin M. Sheerin, Benjamin D. Johnides, Sofie Kuppens, and Charles M. Borduin

Many studies demonstrate secondary benefits for caregivers and siblings who participate in family-based therapies for child mental health problems. Yet, there are no systematic evaluations of the secondary benefits of family-based therapies, which suggests that current estimates of the cost-effectiveness of family treatments represent underestimates of the true economic benefits. In this study, we will use multilevel meta-analysis to characterize the nature and quality of research on the secondary benefits of family-based treatments for child mental health problems.

The results of the proposed study may have critical implications for public policy decisions as well as for continued evaluation of the broader effects of family-based treatments. First, the findings may affect the way researchers and clinicians conceptualize interventions for child mental health problems. Second, the findings may highlight important blind spots (e.g., secondary benefits of treatment to family members resulting in hidden cost savings) in outcome studies that might otherwise lend support to the cost-effectiveness of family-based treatments. Third, this study may motivate professional organizations and federal agencies to increase their advocacy for the dissemination of family-based treatments for child mental health problems.

Daniel Lamm
Madison, MO

Senior
Biochemistry

Sp20-124

Faculty Mentor: Dr. Abraham Koo, Biochemistry

Funding Source: CAFNR On Campus Research Internship

Fueling the Future: Engineering Plants to Create Biofuel, Without Disrupting the Food Supply

Danny Lamm, Athen Kimberlin, Arati Poudel, Minmin Wang, Jay Thelen, and Abraham Koo

With increasing concern over issues such as climate change and food scarcity, it is imperative to find alternatives to fossil fuels, without infringing on land that could be used for food crops. The oil seed crop *Camelina sativa* can be grown in rotation with other food crops, and itself produces an oil viable both for cooking and biofuel applications. The limiting key regulatory step for fatty acid synthesis is the conversion of acetyl-CoA into malonyl-CoA catalyzed by the enzyme Acetyl-CoA Carboxylase (ACCase). Recently a family of proteins, known as Biotin Attachment Domain Containing (BADC), have been observed to co-purify with ACCase and are hypothesized to play a regulatory role in fatty acid synthesis. Based on successful studies in Arabidopsis, this project aims to engineer higher seed oil in Camelina by 1) over producing a limiting subunit of ACCase, α-carboxyl transferase (α-CT), and 2) deregulating the effects of BADC inhibition using RNA-interference (RNAi) technology. Recently established lines containing the α-CT over-expressing or BADC RNAi genes are being analyzed to determine the mRNA transcript levels, and seed oil content. In the next phase, the recently developed ribosomal RNA sequencing technique will be used to further our understanding of the global effects of oil engineering on proteins in the plant. With this project we may one-day see *Camelina* being grown in crop rotations as an alternative fuel source.

Brayden Langendoerfer

Jefferson City, MO

Freshman

Secondary Education (Social Studies)

Sp20-65

Faculty Mentor: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences; Sarah Borowski, Psychological Sciences

Funding Source: ASH Scholars

Coping Strategies in Adolescents: Gender Differences and Implications for Adolescent Health

Brayden Langendoerfer, Sarah Borowski, Amanda Rose, and Ashley Groh

Coping strategies have important implications for adolescent health, including friendship adjustment, emotional well-being, and physical well-being. In terms of friendship adjustment, adolescents who use active coping strategies are more likely to have positive friendship quality (Shin & Ryan, 2012). Research also finds that coping strategies have implications for emotional adjustment, such that adolescents using avoidance coping are more likely to be isolated and anxious (Shin & Ryan, 2012). In terms of physical health, avoidant coping styles have been linked to negative physical health (Wilson et al., 2005). There is also evidence that the association between coping styles and well-being vary depending on gender (Wilson et al., 2005). In the current study, we will examine adolescents' coping in relation to their well-being and whether the relations differ for girls and boys. Participants are friends in 8th, 9th, and 10th grades and were asked to complete survey questionnaires. They completed the Brief COPE (Carver, 1997), which assesses coping strategies. For example, items assess active coping (i.e. taking actions to fix the situation) and avoidance coping (i.e. denying the situation exists). The adolescents also completed the Friendship Quality Questionnaire (Rose 2002 revision of Parker and Asher 1993). To assess emotional well-being, adolescents completed the Multidimensional Anxiety Scale for Children (March et al., 1997) and the Center for Epidemiological Studies Depression Scale (Eaton et al., 2004). The Short Form (36) Health Survey (RAND Health; rand.org) was used to assess physical well-being. Correlational analyses will examine the relations between coping and well-being. T-tests will be used to compare girls and boys in their coping and well-being. Correlational analyses will also test whether there are gender differences in the associations between coping strategies and well-being.

Samantha Lapka
Chicago, IL

Senior
Psychology

Sp20-11

Faculty Mentor: Dr. Kennon M. Sheldon, Psychological Sciences

Organizational Encouragement's Influence on The Donor: An Assessment of Blood Donor Motivation

Samantha Lapka, Milla Titova, and Ken Sheldon

Purpose:
Motivation behind blood donation is an important research area when considering roughly 53,000 units of blood components are needed each day in the United States. Around 38% of the eligible population is able to donate blood, yet only about 3% actually does, causing the current blood drought that the United States faces (American National Red Cross, 2001). Previous research examined blood donor motivation (Goette et. al., 2010; Baseer et. al., 2017; Steele et. al., 2008), but it did not distinguish donors within the sample by their involvement in organizations that encourage participation in blood drives. This study investigates motivation in blood donors in comparison to their relationship to an encouraging organization, which is yet to be researched.
Procedure:
A survey was distributed to blood donors during a blood drive. Participant's motivation for donating, well-being, need satisfaction and future donation perceptions were collected from 242 donors. Participants were categorized into three motivation reason groups : true donor, encouraged by organization, and donating on behalf of someone that is encouraged by their organization.
Results:
We ran a series of ANOVAs, comparing donor reason to motivation, well-being, need satisfaction and views of future donations. Results showed higher scores in autonomous motivation and need satisfaction in true donors compared to other donor groups. We conducted a structural equation model which found that reasons for blood donation led to differences in autonomous motivation, which led to differences in need satisfaction, well-being, and the likelihood of donating in the future.
Conclusions and Implications:
Results of this research are expected to expand the knowledge on blood donors' motivations for donating. This research can be furthered in efforts to understand how encouragement from external sources, and donor motivations, can affect rates of blood drive participation in the United States.

Sadie Lea

Benton, AR

Senior
Journalism (Magazine Journalism)

Sp20-21

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Examining the portrayals of race within African American oriented news sites

Sadie Lea, Kionte Lewis, Rachel Henderson, Brandon Ford, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of African Americans in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four African American online media outlets (e.g., Black Voices, The Grio, Blavity, The Root), with a final sample of N=600. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of African Americans in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of African Americans audiences.

Brandon Lee

Kearney, MO

Junior

Chemical Engineering; Physics

Sp20-27

Faculty Mentor: Dr. Karl D. Hammond, Biomedical, Biological & Chemical Engineering

Funding Source: Karl D. Hammond; Scientific Discovery Through Advanced Computing – SciDAC (K.D. Hammond)

Simulation of Helium in Fusion Reactor Materials

Brandon F. Lee and Karl D. Hammond

The formation of "fuzz," a network of tendril-like nanostructures, on helium-irradiated tungsten surfaces is of keen interest to the nuclear fusion community due to concern that it will impact reactor operation. However, the mechanism by which fuzz forms is not well-understood. To build this understanding, molecular dynamics (MD) simulations have been performed to analyze the processes by which helium diffuses and forms bubbles under tungsten surfaces. The objective is to use the information generated to inform larger-scale models that can simulate helium dynamics at length and time scales relevant to fusion reactors. This study simulates high-flux helium irradiation of a relatively large (approx. 400 nm2 plasma-facing surface) tungsten slab for over 285 ns (fluence 1.4 x 1021 m-2). In these simulations, bubbles are observed whose sizes are comparable with those of bubbles seen in experiments. These large simulated bubbles form by repeated burst/refill cycles. We also observe that the bursting of one bubble can directly cause the bursting of another nearby bubble. The tungsten membrane that separates these "double-burst" bubbles is found to be of approximately the same thickness as that which separates the large bubbles from the plasma.

Alex Lee
Parkville, MO

Junior
Health Science (Pre-Professional)

Sp20-42

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery

Characterizing the Metabolic Profile of the Infrapatellar Fat Pat from Osteoarthritic Knees

Alexander B. Lee, Shelby Y. Salisbury, James L. Cook, and Aaron M. Stoker

INTRODUCTION: Osteoarthritis (OA) is an irreversible musculoskeletal disability commonly seen in middle-aged to elderly populations. Recent studies suggest that the infrapatellar fat pad (IPFP) plays a significant role in the development and progression of OA, but little is known about its metabolism in OA knees. Understanding the IPFP's production of biomarkers may provide insight into the cellular pathways activated by the presence of OA. It was hypothesized that OA IPFPs would have strong ($r>0.7$) correlations between relevant OA-related biomarkers for inflammation and degradation.

METHODS: With IRB approval, IPFPs were obtained from ten OA patients undergoing total knee arthroplasty. Grape-sized explants were made from each IPFP and cultured in 7 ml of DMEM at 37ºC and 5% CO_2. Media was collected after 3 days and used for biomarker analysis. A Pearson's correlation was performed on the data to identify linkages in OA IPFP biomarker production.

RESULTS: Of the degradation-related biomarkers, MMP-1, MMP-2, MMP-9, and TIMP-3 had the most moderate to strong correlations to production of pro-inflammatory biomarkers. There were only two important correlations between degradative enzyme production and TIMPs. There was a strong correlation between IL-1β and TNF-α, but the production of TNF-α had more moderate to strong correlations to production of other pro-inflammatory biomarkers produced by the IPFP.

CONCLUSION: The data from this study indicates potential linkages in the degradative and inflammatory metabolism of the OA IPFP. These results suggest that the IPFP may play a role in the development and progression of OA in the knee.

Kionte Lewis

Rockford, IL

Sophomore
Mechanical Engineering

Sp20-25

Faculty Mentors: Dr. Christopher Josey, Communication;
Dr. Andrea Figueroa-Caballero, Communication

Funding Source: ASH Scholars

Minority News: Examining the portrayals of race within African American oriented news sites

Kionte Lewis, Sadie Lea, Rachel Henderson, Brandon Ford, Andrea Figueroa-Caballero, and Christopher Josey

Research demonstrates that people of color are presented in highly stereotypic ways within traditional news outlets. For example, African Americans have historically been portrayed as criminals and Latinos as undocumented immigrants—thus creating an inhospitable media environment for minority audiences. However, the representation of these groups in social identity focused news (SIFN) outlets has yet to be studied and provide an alternative media source which could serve as a locus of empowerment for these audiences. To explore this potentiality, the current project investigates the portrayals of Latinos in SIFN outlets. Using an equal probability sampling procedure, a composite month was created drawing from one year of archived news content from four Latino online media outlets (e.g. The Grio, The Root, Black Voices, Blativity), with a final sample of N=600. Subsequently, using a team of undergraduate coders, inter-coder reliability was established using 10% of the overall sample. Preliminary results indicate that in terms of both quantity and quality, the portrayals of Latinos in SIFN present a more diverse set characteristics than those found in traditional media outlets. Drawing on extant media effects theories such as the cultivation hypothesis, we argue that exposure to this content has the potential to bolster the collective self-esteem of Latino audiences.

Camryn Long
Richland, MO

Junior
Biological Sciences; Psychology

Sp20-119

Faculty Mentor: Dr. Cheryl Rosenfeld, Biomedical Sciences

Funding Source: NIH grant to Dr. Cheryl Rosenfeld

Xenoestrogen Effects on Hypothalamic and Hippocampal Gene Expression

Camryn Long, Mary Butler, Jessica Kinkade, Madison Green, Rachel Martin, Brittney Marshall, Tess Willemse, Katrin A. Schenk, Jiude Mao, and Cheryl Rosenfeld

The hypothalamus and hippocampus are sensitive to early exposure to endocrine disrupting chemicals (EDC). Two EDC that have raised particular concern include bisphenol A (BPA), a widely prevalent chemical in many common household items, and genistein (GEN), a phytoestrogen present in soy and other plants. We hypothesized that early exposure to BPA or GEN may lead to permanent effects on gene expression profiles for both coding RNAs (mRNAs) and microRNAs (miRs), which can affect the translation of mRNAs. Such EDC-induced biomolecular changes may affect behavioral and metabolic patterns. California mice (Peromyscus californicus) male and female offspring were developmentally exposed through the maternal diet to BPA (5 mg/kg feed weight, low dose- LD and 50 mg/kg, upper dose-UD), GEN (250 mg/kg feed weight), or a phytoestrogen-free control diet (AIN). Behavioral and metabolic tests were performed at 180 days of age. qPCR analysis was performed for candidate mRNAs and miRs in the hypothalamus and hippocampus. LD BPA and GEN exposed California mice showed socio-communication impairments. Hypothalamic Avp, Esr1, Kiss1, and Lepr were increased in LD BPA offspring. miR-153 was increased but miR181a decreased in LD BPA offspring. miR-9 and miR-153 were increased in hippocampi of LD BPA offspring, whereas, GEN decreased hippocampal miR-7a and miR-153 expression. Correlation analyses revealed neural expression of miR-153 and miR-181a was associated with socio-communication deficits in LD BPA individuals. Findings reveal cause for concern that developmental exposure of BPA or GEN in California mice, and potentially by translation in humans, can lead to long standing neurobehavioral consequences.

Bobby Love

Versailles, MO

Sophomore
Psychology; Chemistry

Sp20-169

Faculty Mentor: Dr. Michale Marlo, English

Funding Source: ASH Scholars

Typesetting Luyia Together

Bobby Love, Rebecca Grollemund, and Michael R. Marlo

Overleaf is an online LaTeX (pronounced "lay-tech") editor used to collaboratively author scientific papers and monographs. LaTeX is a typesetting language used to create any figure, equation, graph, or text style imaginable. The ASH Scholars research team Documenting Luyia Together works with the open-access publisher Language Science Press, which requires submitted works to be coded in LaTeX. The publisher offers authors templates in Overleaf for producing their monographs and papers, allowing the publisher to spend less time typesetting books and reducing publication costs. It does, however, place a greater burden on authors to prepare their manuscripts using this technical typesetting language, and my work as a Computer Engineering major on the Documenting Luyia Together team has largely been to assist the team with coding its publications in LaTeX using the Overleaf environment.

I spent the past year converting monographs typed in Microsoft Word documents into LaTeX files using the Overleaf environment. I did not know LaTeX prior to this project, so I learned this new language; compared to C, it was quite easy. LaTeX is particularly useful due to its granularity. For example, when building a table of words and glosses, every aspect of the table (line thickness, spacing, font, location within the page, highlight, etc.) is adjustable and customizable; the same cannot be said of most regular word processors.

The importance of typesetting these works written by Dr. Marlo and our collaborators lies in the fact that the Luyia cluster of languages is understudied, and by extension, does not have very much related literature available. The linguistic works being typeset now will be published and allow researchers and Luyia community members around the world to study and better understand the Luyia language cluster.

Aubrielle Maginness
Columbia, MO

Freshman
Psychology; Chemistry

Sp20-36

Faculty Mentor: Dr. Kristy vanMarle, Psychological Sciences

Funding Source: Discovery Fellowship - Honors College

Foraging Strategies in Preschoolers

Aubrielle Maginness and Kirsty vanMarle

Ideal Free Distribution (IDF) theory predicts that foragers will divide between foraging zones in proportion to the amount of food available in each zone (Fretwell & Lucas, 1970). In a free-operant procedure, IDF characterizes foraging behavior in mallard ducks (Harper, 1982) and human adults (Madden et al., 2002). More recently, vanMarle, Seok, and Billingsly (2018) showed that IDF also characterizes foraging behavior in children: Sixteen 2.5-5-year-olds foraged in two reward zones. Pennies were distributed on a variable interval schedule in each zone and divided evenly between children within the zone at the time of the reward. Zones provided rewards in a ratio of 1:1, 2:1 or 5:1. As predicted, children divided between the zones to closely match the reward proportions. We reanalyzed the same dataset to ask what individual behavior/strategies may have produced group-level matching. Specifically, we investigated (1) what types of foraging strategies were evident, and (2) how strategies related to reward obtainment.
As predicted by IDF, individual children reaped equivalent rewards. For both total number of rewards and total number of times rewarded, rewards were equivalent across individuals (4/6 and 5/6 sessions had non-significant chi-squares ((p>.05), respectively; Figure 1). One way to achieve group-level matching is if individuals exhibit matching behavior. This was not a predominant strategy. Instead, children could be categorized as "stayers" (0-1 switches/session, n=9) or "switchers" (2+ switches/session, n=6), if they stayed or switched in more than half of their sessions. Strategy was not related to total rewards (r(15)=-.09, p>.05) (Figure 2). In sum, group-level matching did not result from individual matching. Instead, children achieved equivalent rewards by dividing between rich and poor zones early in the session. Future studies will test individual children in both group and individual foraging

Simon Manring
Columbia, MO

Junior
Chemistry

Sp20-74

Faculty Mentor: Dr. Silvia Jurrison, Chemistry

Funding Source: LIfe Science Undergraduate Research Opportunity Program (LSUROP)

Synthesis of a Trithiol Ligand for 72, 77As Theranostic Pharmaceutical Applications

Simon E. Manring, F.Najafi Khosroshahi, and S. S. Jurisson

Prostate cancer is the second most deadly cancer in men, affecting about every 1 in 9 male patients. Among several efforts to treat this disease, our research focuses on ^{72}As β+ 3.33 MeV, $t_{1/2}$=26 h) and ^{77} As (β- 0.683 MeV, t1/2=38.8 h) as a paired candidate for theranostic radiopharmaceuticals. These therapies typically make use of Bombesin (BBN) analogues to target gastrin-releasing peptide (GRP) receptors. GRP receptors are expressed in the pancreas of normal mice and in human prostate cancers. Previous work with Bombesin analogs used an As-trithiol ligand to target GRP receptors, due to the high in-vivo stability of the As-trithiol complex. However, this ligand's lipophilicity resulted in high hepatobiliary clearance without significant pancreatic uptake. Our research promotes a more hydrophilic, bifunctional trithiol ligand for use with the ^{72}, ^{77}As theranostic pair. This new trithiol ligand is successfully conjugated to a GRP receptor antagonist. The syntheses of the new ligand and its arsenic complex, its IC_{50}, radiolabeling studies, and biodistribution studies will be discussed.

Matthew Martin
Columbia, MO

Senior
Civil Engineering

Sp20-35

Faculty Mentor: Dr. John Bowders, Civil and Environmental Engineering

Funding Source: College of Engineering Program Undergraduate Research Option

Foundation Design: Presumptive vs. Measured Strength of the Burlington Limestone

Matthew Martin and John Bowders Jr.

Much of the campus of the University of Missouri is underlain by bedrock consisting of Burlington limestone. When new structures are built on campus, often the foundation of the structure must be set into bedrock, as it provides superior strength and stability versus foundations on soil. When designing deep foundations, the strength of the bedrock influences how robust the foundation must be. The weaker the bedrock, the larger and more expensive the foundation. Often, foundation designers will use an assumed, or presumptive, value of strength for the bedrock, rather than sample and test the rock. The presumptive value must be conservative (lower bound), and as a result, the foundation is likely to be overly robust and expensive. It is hypothesized that the use of presumptive rock strengths is resulting in over-designing foundations on Burlington limestone and that costs of foundations can be reduced by sampling the rock, measuring the rock strength and using the measured strength for design. Twenty (20) tests on specimens of the Burlington limestone resulted in an average strength of 1300 ksf with a standard deviation of 550 ksf. If one uses a 270 ksf strength for design, there is a 1 in 10,000 chance that the actual strength will be less, and this design strength is more than six (6) times the presumptive value of 40 ksf. Over-designing new foundations on Mizzou's campus could be avoided by using measured strengths for the bedrock thus reducing the costs of foundations. Additional specimens of the bedrock must be tested to provide a robust database on the geologic variability of the Burlington formation and further ensure the safety of any future foundations for Mizzou buildings.

Rachel Martin

St. Louis, MO

Senior
Biological Sciences; Music

Sp20-116

Faculty Mentor: Dr. Cheryl Rosenfeld, Biomedical Sciences

Funding Source: NIH grant to Dr. Cheryl Rosenfeld

Gestational Exposure to Oxycodone Affects Later Socio-communication Behaviors in Mice

Rachel Martin, Madison Green, Jessica Kinkade, Jiude Mao, and Cheryl Rosenfeld

An increasing number of women are consuming opioids while pregnant. The use of opioids during pregnancy can lead to neonatal opioid withdrawal syndrome (NOWS). Birth outcomes associated with OUD include preterm birth, poor fetal growth, low birthweight, and possible birth defects. Even if they do not demonstrate outright problems at birth, OUD newborns may be plagued with health consequences. Oxycodone is one of the primary opioids overprescribed for pain, including in pregnant women. We hypothesize that as an opioid, oxycodone may have direct effects on fetal brain development that will lead to behavioral problems later on in life. To test this hypothesis, we exposed 12 female CD1 mice to 1.5mg/mL oxycodone and 12 female CD1 mice to 0.9% saline. Doses were calculated as 5mg/kg of the mouse bodyweight. Each group was exposed for two weeks prior to pairing and throughout gestation. Treatments ceased after each mouse gave birth. At weaning (PND21), one male and one female were randomly selected from each litter for behavioral analysis, including examining for socio-communication and cognitive deficits and anxiogenic behaviors. Pups were tested in the Crawley's three-chambered social test and then recorded in an Ultrasonic Vocalization (USV) chamber. In the three-chambered social test, male offspring exposed developmentally to oxycodone demonstrated social impairments by spending less time investigating novel individuals and either more time alone or with a habituated individual ($p \leq 0.05$). Offspring exposed to oxycodone were more likely to communicate in the ultrasonic range (> 20 kHz) compared to controls ($p = 0.02$) Findings suggest oxycodone mice show deficiencies in social behaviors and changes in vocalization patterns, which raises the concern that similar behavioral disruptions may occur in children exposed in the womb to this drug.

Kelsey Mason
Kansas City, MO

Senior
Biological Sciences; Psychology

Sp20-16

Faculty Mentor: Dr. Matthew Will, Psychological Sciences

Funding Source: Department of Psychology Undergraduate Research Grant

Sigma-1 Receptor Antagonist PD144418 Selectively Reduces Female Motivation for Sucrose During Negative Energy Balance

Kelsey L Mason, Leticia L Rivera, Mikala E Cessac, Jeffrey L Bodeen, Emily L Bathe, Melissa A Tapia, Jenna R Lee, Dennis K Miller, and Matthew J Will

PD144418 (PD) is a potent, selective sigma-1 receptor antagonist used to investigate rewarding processes. Previous experiments using PD indicate there is a dose-dependent reduction in locomotor activity induced by cocaine and methamphetamine, while not altering basal locomotor activity in mice. Also, PD has been shown to lower motivational effort of food-reinforced behavior in male rats without changing food palatability or appetite. Research has yet to investigate PD's effects on motivational effort of food-reinforced behavior when depriving subjects of food for 24 hours, nor the effects observed in females. Thus, this study examined effects of PD on food motivation in male and female rats using an operant task under ad libitum or food-deprived conditions. To do so, rats were trained on a progressive ratio reinforcement schedule to earn sucrose pellets. After training, the rats were given intraperitoneal injections of one of three PD doses (saline, 3.16μmol, or 10μmol) 15 minutes before testing. Results showed that when rats have ad libitum food access, at the 10μmol/kg dose, PD significantly decreased the number of active lever responses for sucrose pellets in males and females. When rats were food deprived (24-hours), PD did not change motivation for food reinforcers in males nor females. However, at the highest dose, PD changed the number of earned food reinforcers in female rats. To ensure that there were no effects on locomotor activity in the operant task, after an acclimation period, a separate set of rats were injected with the same doses mentioned previously and placed in locomotor chambers (50cm x 50cm x 38cm) where activity was measured for 60 minutes. Results revealed no effect of PD144418 on locomotor activity in either sex. Therefore, it is evident that PD144418 decreases motivation for food reinforcers in male and female rats with no effect on locomotor activity.

Eddie Maxwell

Lilbourn, MO

Junior
Biological Sciences

Sp20-164

Faculty Mentors: Dr. Hsin-Yeh Hsieh, Veterinary Pathobiology; Dr. George Stewart, Veterinary Pathobiology

Degradation of Hydroxyatrazine using AtzB from Pseudomonas sp. strain ADP

Eddie Maxwell, Shu-Yu Hsu, Chung-Ho Lin, George Stewart, and Hsin-Yeh Hsieh

Hydroxyatrazine (HA) is a metabolite of Atrazine, a toxic herbicide of the triazine family frequently found in the soil and groundwater in the United States which could contaminate drinking water. This compound can cause kidney and neuroendocrine problems in humans and animals. Atrazine is currently banned in Europe because of its toxicity to human health. However, there are not many restrictions on its usage in the United States resulting in it to contaminate drinking water [WHO, 2010]. A catabolic pathway of atrazine degradation had been well defined in the *Pseudomonas sp*. Strain ADP that was isolated from a heavily atrazine-contaminated site [Mandelbaum et al., 1995]. There are six enzymes (AtzA-F) required to break down atrazine to carbon dioxide and ammonia in the pathway and encoded in the plasmid pADP-1 of the strain [Martinez-Vaz *et a*l., 2001]. The goal of my study is to produce recombinant AtzB enzymes for the degradation of hydroxyatrazine (HA).

The *N*-ethylaminohydrolase (AtzB) gene in the plasmid pADP-1 was amplified by PCR, cloned into the vector pSC-A and later inserted to *Escherichia coli* cells. The gene sequence in the clones were checked for no mutation in the promoter region and open reading frame of AtzB [Boundy-Mills *et al*., 1997]. The correct cloned strain will be utilized for recombinant AtzB protein production. The AtzB enzymatic reaction using hydroxyatrazine as substrate will be performed to evaluate the enzymatic activity of recombinant AtzB protein [Seffernick *et al*., 2007]. The results of the enzymatic reactions will be analyzed with Liquid Chromatography and tandem mass spectrometry (LC-MS/MS).

Madalyn Michael
Imperial, MO

Junior
Communication Science and Disorders

Sp20-51

Faculty Mentor: Dr. Mili Kuruvilla-Dugdale, Speech Language and Hearing Sciences

Articulatory Coupling in Parkinson's Disease: Does Word Complexity Matter?

Madalyn Michael, Makenzie Thoenen, Dylan Thompson, Alyssa Buie, Tara Fogarty, Emma Travis, and Mili Kuruvilla-Dugdale

Typical young adults exhibit relatively independent movement of non-adjacent tongue regions such as the tip and dorsum during speech production. Such independence, indexed by a strong negative correlation of non-adjacent tongue region movements, allows for adequate phonetic distinctiveness during speech production. Therefore, the degree of negative intralingual coupling is an important metric of speech motor performance that is particularly relevant to our understanding of the articulatory mechanisms that underlie reduced speech precision and intelligibility loss in dysarthria. The aim of the current study was to examine if intralingual coupling is altered in Parkinson's disease (PD) and whether intralingual coupling varies with phonetic complexity demands in PD. 3D electromagnetic articulography was used to track tongue tip (TT) and tongue dorsum (TD) movements of 15 people with PD and 15 healthy controls, during 10 target words representing either low or high phonetic complexity levels. Phonetic complexity was calculated using the Kent (1992) framework. Intralingual coupling was estimated from a covariance index comprising the average pairwise correlation and standard deviations of TT and TD movements for each word. Preliminary results from 16 participants show highly coupled intralingual movements for high complexity words in controls. By contrast, in PD, regardless of phonetic complexity, weak intralingual coupling was observed, potentially driven by restricted movement of one or both tongue regions. The study findings will help advance our understanding of the articulatory mechanisms contributing to speech imprecision in PD and will allow us to meet translational needs aimed at developing more sensitive speech assessments for dysarthria.

Laura Miserez

Jefferson City, MO

Senior

Political Science; Journalism (Magazine Journalism)

Sp20-102

Faculty Mentor: Dr. Jonathan Krieckhaus, Political Science

Declining Press Freedom in Brazil

Laura Miserez and Jonathan Krieckhaus

Several press freedom groups around the world track how dangerous different countries are for working journalists by several indicators. There are a few countries that receive lots of attention for their poor press environments. Turkey. China. Syria. Mexico. However, countries that don't fit into this "worst-case scenario" group receive far fewer attention than their problems warrant. This paper aims to combine key research from several national and international press freedom groups to offer a snapshot of the situation in Brazil. Because it's not as bad as neighboring Venezuela or Mexico, Brazil's problems with press freedom largely fly under the international radar. They shouldn't. In the last decade, Brazil has taken several steps backward when it comes to how free and safe its journalism is. The number of cases of violence against journalists in the country exploded in 2013 following widespread protests, and has still not decreased to pre-protest levels. The number of murders jumped in 2011 and remains one of the highest among non-war zones. Over half of those murders are left unsolved. Brazil is the sixth-most populated country in the world and the fourth-largest democracy in the world. Its media environment matters, and the recent trends are concerning. This research paper explores those trends, offers explanations about their origins, and notes some reasons to remain hopeful.

Jordyn Moaton
Frankfort, IL

Senior
Biological Sciences

Sp20-160

Faculty Mentor: Dr. Elizabeth King, Biological Sciences

Funding Source: NIH Initiative for Maximizing Student Diversity (IMSD-EXPRESS)

The Evolution of Starvation Resistance in Relation to Nutrient Availability

Jordyn Moaton, Zeke Elkins, and Elizabeth King

An animal's ability to withstand prolonged periods of food deprivation is called starvation resistance. Starvation resistance (SR) is a phenotypic trait of great environmental significance.
In environments where there are shortages of food, those who can resist starvation for longer periods of time to thrive compared to other organisms. The purpose of this project is to study the underlying mechanisms in starvation resistance using *Drosophila melanogaster* as a model. We used a large- scale experimental evolution design, placing fruit flies on 3 different selection treatments, constant high, fluctuating, and deteriorating nutrients availability, for over 50 generations each with 12 replicates. For the first treatment, constant high availability (CHA), flies are given a high sugar diet their entire lifespan. In the second treatment, fluctuating availability (FA), flies on this regime are fed a standard diet then a low yeast diet then back to a standard diet to the end of their lifespan. In the final treatment, deteriorating availability (DA), flies are given a standard diet then are fed a low yeast diet to the end of their lifespan. Flies 12 days po, post oviposition, from each nutrient regime were placed on a maintenance diet, and then transferred to vials containing only nutrition less agar. These vials were checked approximately every twelve hours, beginning at 8:30am and 8:30pm daily. The number of flies confirmed dead in each period was then recorded until all flies were confirmed dead over the span of roughly two weeks. Flies on the fluctuating availability treatment are expected to exhibit higher levels of SR due to evolved higher rates of lipid and carbohydrate storage than the DA and CHA treatments. We link these phenotypic changes to changes at the genetic level in these lines. These results have implications for understanding the conditions that might select for higher or lower starvation resistance and the underlying genetic mechanisms determining those changes.

Amanda Montgomery
Columbia, MO

Senior
Psychology; Middle School Education (Mathematics)
Sp20-31

Faculty Mentor: Dr. Jordan Booker, Psychological Sciences

Antecedents and Implications of Communion among Emerging Adults

Amanda M. Montgomery and Jordan A. Booker

Purpose: Communion is an innate motivator in humans that refers to one's relationships with others (Bakan, 1966; McAdams, Hoffman, Mansfield, & Day, 1996). Communion has direct implications for life satisfaction and well-being (McLean et al., 2019) and reflects individual differences in personality and shapes individuals' values. We were interested in considering the role of communion for well-being among emerging adults (Arnett, 2000). Communion is salient during emerging adulthood, as this developmental transition involves challenges in exploring personal identity and building intimacy with others (i.e., romantic dating, child-rearing). We were interested in the ways demographic differences (i.e., gender, SES) explain differences in communion and in the ways displays of communion inform reports of well-being.

Procedure: As part of a secondary analysis, 300 adults aged 18-to-29 (m_{age}= 24.29 years, SD=$\pm$2.67 years; 60% women) were considered from an online study. Participants responded to narrative prompts about high- and low-point life events. These autobiographical narratives were rated on a scale indicating displays of overall communion (i.e., whether other partners were mentioned, whether implications for the relationship were mentioned), based on a coding scheme by Grysman, Fivush, Merrill, and Graci (2017).

Results: Bivariate correlations showed that women displayed more communion in recollections of positive life events than men. Age, income, and education level were not associated with communion. Displays of communion in negative, life events were significantly associated with multiple reports of well-being. Communion was associated with more optimal reports of well-being.

Discussion: Gender informed differences in communion for positive life events, whereas communion in recollections of negative life events informed reports of well-being. These findings partly supported our hypotheses. This research is important in expanding the existing literature on communion, especially among emerging adults. Further research should consider the longitudinal effects of communion among emerging adults.

Marissa Mueller

Shorewood, IL

Senior
Biochemistry

Sp20-103

Faculty Mentors: Dr. Teresa Lever, Otolarygology - Head and Neck Surgery; Dr. Nicole Nichols, Biomedical Sciences

Funding Source: NIH R21 DC016071 (Lever);University of Missouri Veterinary Research Scholars Program, IDEXX-BioAnalytics, and the Spinal Cord Injury and Disease Research Program (SCIDRP; Nichols)

Identification of a biomarker for genioglossus tongue muscle atrophy in a mouse model of amyotrophic lateral sclerosis

Marissa Mueller, Nicole Nichols, and Teresa Lever

Abstract withheld due to proprietary permissions.

Oriana Myers
St. Peters, MO

Senior
Biological Sciences; Psychology

Sp20-93

Faculty Mentor: Dr. John Kerns, Psychological Sciences

Altered Frontoinsular Activation and Cortical Gyrification Associated with Daily-Life Negative Affect in Emotional Distress Disorders

Oriana T. T. Myers, Jessica P. Y. Hua, Anne M. Merrill, Kelsey T. Straub, Timothy J. Trull, and John G. Kerns

Individuals with emotional distress disorders experience high levels of daily-life negative affect. Furthermore, the ability to effectively use emotion regulation strategies, such as positive reappraisal, is impaired in emotional distress disorders. Altered frontoinsular functioning in regions important for emotion regulation, such as default mode network hubs (e.g., medial prefrontal cortex [PFC]) and insula, has been found in these disorders. Cortical structural abnormalities, such as morphological aberrations related to gyrification, surface area, and thickness, have also been found in emotional distress disorders and could be indicators of aberrant underlying neural connectivity. However, the relationship between frontoinsular emotion regulation task activation and cortical morphology with daily-life negative affect is still relatively unknown. In the current study, individuals with emotional distress disorders (n = 27) completed multimodal neuroimaging consisting of both positive reappraisal emotion regulation task-based fMRI and structural MRI. Daily-life emotional distress symptoms were measured using an ambulatory assessment approach, whereby participants reported negative affect levels in their daily lives for two weeks (average number of daily-life affective assessments = 80). Increased medial PFC activation during positive reappraisal was associated with increased daily-life negative affect. In contrast, *decreased* positive reappraisal task activation in the left insula, as well as cognitive flexibility regions such as the cerebellum and putamen, was associated with increased daily-life negative affect. Additionally, hypergyria of the left insula and hypogyria of the right inferior/posterior parietal cortex were associated with increased daily-life negative affect. These results provide converging multimodal evidence that altered frontoinsular emotion regulation task activation and cortical gyrification abnormalities may be important markers and treatment targets in emotional distress disorders.

Ellie Naumann

Waterloo, IL

Senior

Political Science; History

Sp20-72

Faculty Mentor: Dr. William T. Horner, Political Science

Comparing U.S. and the United Nations' Refugee Responsibility From 1998-2018

Ellie Naumann and William T. Horner

In this comparative analysis the role of refugee responsibility as an international or domestic issue is discussed. Refugee responsibility in this thesis is described as taking financial, legislative, and hands-on means to aid in the resettlement and relief of globally displaced people. Problems such as American exceptionalism, sovereignty, and customary law have been consistent ousts for U.S. policy makers to use as a means of avoiding international commitments regarding refugee relief. Additionally, U.S. immigration history notes the lack of domestic responsibility exhibited by the U.S. government. In fact, refugees have little to no human rights protections.

Data was collected from the UNHCR and the Department of Homeland Security. Firstly, U.S. immigration data is compared to that of other United Nations countries. Then, the data is compared to the change in U.S. immigration policy over the Clinton, Bush, Obama, and Trump administrations. We can evaluate the responsibility that the U.S. is taking to relieve the growing number of displaced people.

My findings show that the U.S. has maintained the same relative standard of aid for refugees and immigrants up until 2018. Under the Trump administration, the numbers of admitted refugees and asylum seekers decreased, despite the continued growth in numbers of refugees. This finding suggests that the U.S. is not upholding their due responsibility in combating the global refugee crisis on an international or domestic level. The U.S. is diminishing resettlement for the first time since 1998. It is important to note that rhetoric, especially under President Trump, influences immigration policy and public opinion. For future research, I recommend looking further into the policies and actions taken by the U.S. at the southern border as a means of deference compared to the number of illegal border crossings.

Claire Neighbors
Lee's Summit, MO

Junior
Biological Sciences

Sp20-81

Faculty Mentor: Dr. Paula McSteen, Biological Sciences

Funding Source: BioInformatics in Plant Sciences (BIPS)

Quantification and measurement of veins in maize leaf through image analysis

Claire M. Neighbors, Janlo M. Robil, Michael Boeding, Filiz Bunyak-Ersoy, and Paula McSteen

C4 plants, like maize, are more efficient in photosynthesis primarily due to higher leaf vein density. Since high density of veins is key to efficient photosynthesis, it is imperative to develop efficient methods to visualize and analyze vein traits in this plant group. Here, an analysis of vein density and other vein traits in five maize inbred lines (B73, Mo17, A619, A632 and W22) was performed using a starch staining procedure. Leaves three (L3) and four (L4) of juvenile plants were cleared and stained with iodine potassium iodide (IKI) to visualize and quantify the venation pattern. There is an indication that variation exists within the five inbred lines. Since the plant hormone auxin is known to control vein development, vein densities of L3 and L4 of an auxin-deficient mutant, *vanishing tassel2* (*vt2*), were compared to those of normals. Surprisingly, *vt2* possesses a higher vein number and density than normal. This indicates an auxin dependent regulation of vein development in maize and warrants further investigation into the role of the hormone in the process. An image analysis tool was developed to quantify veins semi-automatically through the use of multiple image analysis techniques which include edge detection, convolution smoothing, connected component labeling, and signal processing. For future investigations, the image analysis tool will be used to annotate images that can be used to train a deep learning neural network for high-throughput quantification of veins that will allow for a greater number of inbred lines and maize mutants to be analyzed.

Ashley Nelson

St. Louis, MO

Freshman

Natural Resources Science and Management

Sp20-44

Faculty Mentor: Dr. Samniqueka Halsey, School of Natural Resources

Effects of Hunting on Chronic Wasting Disease Prevalence in White-Tailed Deer

Ashley Nelson and Samniqueka Halsey

Chronic Wasting Disease (CWD) is a prion disease that is contagious to several species of cervids, including White-Tailed and Mule Deer, Elk, and Moose. Since its discovery in the 1960s, CWD has spread throughout much of the United States and Canada. Although it is wide-spread and has been reported in America for several decades, implementation of management is difficult due to the lack of knowledge on transmission methods. One such management method is increasing the hunter-harvest of deer to control deer populations and decrease the number of infected individuals able to spread the disease. To examine if there is a correlation between hunter-harvested deer and CWD prevalence since CWD was first detected in Missouri in 2011, we gathered data from the Missouri Department of Conservation's hunter harvest records from 2011 to 2018, sorting by sex and county. We did the same with MDC's records of the confirmed cases of CWD, comparing the rates of harvest and prevalence year to year to determine a relationship. For each county, we calculated CWD prevalence estimates by dividing the number of deer tested positive by the total number tested and developed a ratio that compared year to year prevalence rates with year to year hunter harvest rates. The results of this study will provide insight into the effect hunter harvest has on CWD prevalence in Missouri deer which may allow for more concrete management techniques regarding the spread of the disease in the future.

Amanda Nieters

St. Louis, MO

Senior

Psychology; Biological Sciences

Sp20-182

Faculty Mentor: Dr. David Bersdorf, Psychological Sciences; Cory Riecken, Psychological Sciences

Cortical Volumes Predict Treatment Outcomes to Propranolol in Autism Spectrum Disorder

Amanda Nieters, Cory Riecken, and David Beversdorf

Main Purpose: Previous research has shown that scores on the General Social Outcome Measure (GSOM) improve after administration of propranolol in those with autism spectrum disorder (ASD), suggesting it induces an increase in general social functioning (Beversdorf et al, 2014). In a current open label study, eligible individuals participate in a 12-week, double blinded trial for propranolol. Throughout the trial, GSOM scores are measured before and after the 12-week period to measure an increase in social behavior. In ASD patients, Wernicke's Area and insular cortex are regions of interest (ROIs) due to their influence in social behavior and communication. This research evaluates biomarkers as an indicator in the efficacy of propranolol as an intervention for ASD.

Procedure: The sample consists of five participants recruited from the Thompson Center for Autism and Neurodevelopmental Disorders who are clinically diagnosed with ASD. The participants included are in an open label propranolol study. Structural MRIs were taken prior to drug administration in the open label study for propranolol. Free surfer was utilized to obtain gray matter volume. R analysis was performed to correlate the ROIs linearly to the change in GSOM over the course of the previous open label study.

Results and Conclusions: Significant relationships between gray matter volume and GSOM scores were found only within the Facial Expressions category. Left hemisphere insula volume was found to be significant, however, there were no significant relationships found between the left or right superior temporal gyrus and GSOM. Right hemisphere cingulate areas were found significant as well as multiple other regions across the frontal, temporal, and occipital lobes. Subcortical areas were significant in the right and left nucleus accumbens, and the caudate in the right hemisphere. These results indicate these areas could enhance how propranolol is used as an intervention for ASD in the future.

Connor Nordwald

East Prairie, MO

Junior
Plant Sciences

Sp20-109

Faculty Mentor: Dr. Paula McSteen, Biological Sciences

Funding Source: CAFNR On Campus Research Internship

Characterizing the interactions between Suppressor of Sessile Spikelet Mutations (Sos2 and Sos3)

Connor Nordwald, Katy Guthrie, Amanda Blythe and Paula McSteen

Maize and other grasses provide the globe with the large quantities of food needed to sustain a growing population. One major developmental difference of maize is that it produces spikelets in pairs rather than the single spikelet structure seen in rice, wheat and barley. These spikelets are of great importance to the plant, as well as to the farmer due to the fact that they go on to house the anthers in the tassel and the kernels in the ear, this is why there is always an even number of kernels on an ear. Maize spikelets form in pairs from the inflorescence meristem (IM) which produces spikelet pair meristems (SPM). The SPM then splits into two spikelet meristems (SM). In order to understand this process, the semi-dominant Suppressor of Sessile Spikelets mutations (Sos2 and Sos3) are being studied and compared to observe the genetic interactions of the two genes. Mapping by sequencing has also been done on these genes to compare their chromosome number and loci. Heterozygous *Sos2* and *Sos3* mutants produce single spikelets in the tassel and the ear indicating a defect in SPM development. Homozygous *Sos2* plants produce ears and tassels with only a few spikelets present while homozygous *Sos3* plants are characterized as having barren patches throughout the tassel and ear. To observe the relationship between these two genes, a double mutant analysis has been reproduced to determine the genetic interactions between the crosses of *Sos2* and *Sos3* with other mutants withing their predicted pathway. Confocal microscopy has also been performed on the mutations using the marker PIN: YFP, in order to see what affect the mutations have on localization and concentration of the plant growth hormone, auxin. The results of these experiments should provide a clearer insight as to whether or not *Sos2* and *Sos3* are related genes.

Carrick O'Bleness

Kansas City, MO

Freshman
Film Studies

Sp20-176

Faculty Mentors: Dr. MIchael Marlo, English; Dr. Rebecca Grollemund, Linguistics

Funding Source: ASH Scholars

Documenting Luyia Together: Talking Wordlists

Carrick O'Bleness, Sophie Kennedy, Adrienne Pyeatt, Rebecca Grollemund, and Michael R. Marlo

This presentation describes research activities of the ASH Scholars research team *Documenting Luyia Together* during the 2019-2020 academic year on our Luyia-Soga Talking Wordlists subproject. The overall goal of our team is to describe and document languages of the Luyia cluster spoken in Kenya and Uganda. These languages belong to the Bantu linguistic group that counts approximately 500-600 languages spoken in sub-Saharan Africa. Within Luyia, we can distinguish several language varieties such as Nyore, Saamia, Khayo, and Tsootso. The language varieties in the region are underdocumented in the sense that most lack much published research about their linguistic properties, and few have been the subject of grammatical descriptions, dictionaries, or collections of oral literature.

Our subteam has focused on processing linguistic materials collected from speakers of 14 languages from the Luyia cluster and from the Soga cluster of language to the west of the Luyia varieties. The materials include a set list of about 600 words written in the language, an English translation, and an audio recording with pronunciations of each of the words on the list from a speaker of the language. Our work has been to process the audio recordings of an interview with the speaker using the Audacity software package. We extract example pronunciations from the longer interview recording and then link individual audio files to the corresponding entries in the wordlist.

Our talking wordlists serve as a precursor to a written lexicon for the language, providing pronunciations and definitions for a variety of classes and types of words. They facilitate the study of prominent features of the languages, such as phonology and morphology. Moreover, the lists allow for the comparison of the languages in the cluster to determine the relatedness of the languages and to establish a language classification and family tree.

Chase O'Neal
Bloomington, IL

Senior
Psychology

Sp20-2

Faculty Mentor: Dr. Nicole Campione-Barr, Psychological Sciences

Parental Authority Legitimacy's Influence on Adolescent Disclosure

Chase O'Neal, Christopher Odudu, and Nicole Campione-Barr

Major Purpose: Studies repeatedly show that parent's knowledge, stemming from adolescent disclosure, of their adolescent's whereabouts, activities, and friends leads to less norm breaking and delinquency (Kerr & Statin 2000). Importantly, when adolescents viewed their parents as having more parental authority legitimacy (PAL) to regulate an issue, they were more obligated to tell their parent (Smetana, Metzger, et al. 2006). Yet, few studies have explored the connection between parents' and adolescents' views of PAL and adolescent disclosure, particularly, over time. The proposed study examined these associations, while also investigating the roles of adolescent gender, sibling birth order, and the social cognitive domain of the issues adolescents disclosed about (Turiel, 2002).

Procedure: The study's sample contained 145 predominantly White and middle-class families with at least two adolescents and one participating parent at Time 1. Youth participants ages ranged from 11 to 21 years, with younger siblings' ages ranging from 11–17 years (M=13.67, SD=1.56) and older siblings from 14–21 years (M=16.46, SD=1.35). Data from the present study utilized the Legitimacy of Parental Authority with Time 1 youth reports of PAL (Smetana, 2000; α=.86-.89), and Time 4 youth reports of adolescent disclosure across 5 domains using the Obligations to Disclose measure (Campione-Barr et al., 2015; Smetana et al., 2006; α=.80-.91, with exception of older siblings ratings of Conventional issues=.58).

Results: Hierarchical regression was used to examine the moderating influence of adolescent gender and birth order on the association between perceptions of parental authority legitimacy and adolescent self-disclosure across five social cognitive domains over time. Results (see Table 1) indicate main effects were qualified by significant and marginally interactions between perceptions of parental authority legitimacy and gender. Simple slopes analyses suggests that when male adolescents believed it was acceptable for a parent to make a rule in the moral domain, they self-disclosed less moral information (t=-4.30, p<.001) and less conventional information (t=-2.89, p<.001) four years later. Simple slopes analyses also show that the interactions was not significant for females in the moral domain (t=.13, p=.89) and conventional domain (t=-.24, p=.81).

Conclusion: Findings provide insight into parental authority legitimacy's influence and adolescent disclosure, since adolescent voluntary disclosure has been associated with reducing involvement in risky behavior through parental knowledge (Smetana, 2008). The findings are useful for the further development of adolescent disclosure research and parents who want to increase their knowledge of their adolescent's life.

Sydney Oberdiek

Platte City, MO

Junior
Biochemistry

Sp20-154

Faculty Mentor: Dr. Hsin-Yeh Hsieh, Veterinary Pathobiology; Dr. George Stewart, Veterinary Pathobiology

Using a qPCR Technique to Monitor Germination of Bacillus anthracis Spores in Soil

Sydney A. Oberdiek, George C. Stewart, and Hsin-Yeh Hsieh

Bacillus anthracis is a Gram-positive, endospore forming, rod-shaped bacterium that causes anthrax, a fatal disease of livestock (primarily cattle, goats, and sheep). This bacterium sporulates under unfavorable growth conditions to produce spores, which are the infectious form of *B. anthracis*. Spores are highly resistant to environmental stressors including extreme temperatures, desiccation, UV and γ-irradiation, oxidation, and harsh chemical treatments. Spores are found worldwide and remain in a dormant, non-reproductive stage for decades to centuries in the soil. However, the introduction of specific nutrient stimuli (germinants) may cause endospores to germinate into vegetative cells. It is known that *Bacillus anthracis* efficiently germinates inside a living host, but it is possible that nutrients in the soil may cause germination to occur outside of a living mammalian host.

The goal of this study is to determine whether *B. anthracis* spores can germinate in soil environments. Quantitative polymerase chain reaction (qPCR) will be utilized to quantify DNA from viable *B. anthracis* cells. Absolute quantification of gene expression using SYBR Green dye will be applied to real-time PCR. The Sterne vaccine strain of *B. anthracis* that is attenuated for virulence will be utilized. The PCR amplification target is the protective antigen (PA) gene that resides on the pXO1 virulence plasmid. If the spores germinate, DNA is extracted from the resulting vegetative bacterial cells. Environmental conditions favoring spore germination can then be examined. If spores can germinate in soil, followed by replication and re-sporulation, it would contribute to persistence of the spores in soil and potentially greater exposures to grazing animals.

Haley Ockerhausen
Chesterfield, MO

Senior
Biomedical Engineering

Sp20-84

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery; Dr. Chantelle Bozynski, Orthopaedic Surgery; Dr. James Cook, Orthopaedic Surgery

Correlation of Subchondral Bone Biomechanical Properties to Comprehensive Properties of Articular Cartilage from Osteoarthritic Knees

Hayley G. Ockerhausen, Tyge J. Ortega, Muhammad H. Salim, Matthew Gao, Ashwin Garlapaty, Conner B. Schmid, Chantelle C. Bozynski, James L. Cook, James A. Keeney and Aaron M. Stoker

INTRODUCTION: Osteoarthritis (OA) is a multifactorial disease progressing from an initial injury to whole-joint inflammation and degeneration causing pain and dysfunction. This study was designed to determine how the biomechanical properties of the subchondral bone correlate with various properties of the articular cartilage. It was hypothesized that there would be important correlations among these assessments of articular cartilage and the subchondral bone from osteoarthritic knees.

METHODS: With IRB approval and patient consent, knee articular surfaces were collected from patients undergoing total knee arthroplasty. Explants were created, separated into individual bone and cartilage explants, and then cultured. The media were collected for biomarker analyses and then the explants were processed for biomechanical testing and histological analysis. A Spearman's correlation was performed to identify correlations between the properties of the bone and cartilage.

RESULTS: The data indicates few important correlations between bone biomechanical properties and the structure and metabolism of cartilage. However, as cartilage thickness decreased, modulus, stiffness, stress, energy and toughness of the bone increased, indicating substantial remodeling of subchondral bone as articular cartilage degrades during OA. Overall, the study indicates no strong relationship between the bone biomechanical properties and the degradative metabolic responses of the cartilage.

CONCLUSION: The results from this study provide direction for research, suggesting that pathways other than those assessed may be of higher importance. Ongoing studies in our laboratory are aimed at further characterization of these complex interactions during development and progression of OA towards better defining disease mechanisms and optimizing preventative and therapeutic strategies.

Maya Parker-Smith

Kansas City, MO

Senior
Biological Sciences

Sp20-152

Faculty Mentor: Dr. Lauren Sullivan, Biological Sciences

Funding Source: A&S Undergraduate Research Mentorship Program

The importance of seed storage methods for germination and growth rates

Maya Parker-Smith and Lauren Sullivan

Anthropogenic impacts result in global species loss. For example, Missouri has lost 99% of its prairie habitat due to farming and urbanization. Fortunately, the Missouri Botanical Garden (MoBOT) is actively preparing for the predicted loss of plant species diversity by creating a seed bank for every native plant species in Missouri to preserve the state's diversity. However, the researchers at MoBOT have not tested which seed storage method (refrigerator or freezer) will result in the highest germination and growth rates of their stored seed. Therefore, it is highly possible that efforts toward longterm seed storage are amassing seeds that are unable to germinate, or have low growth rates. If these seeds are rendered useless due to an improper storage method, then our extensive preservation efforts are no longer applicable. Therefore, we ask the question: how do seed storage methods affect the germination and growth rates of 3 Missouri prairie species (*Helianthus mollis, Rudbeckia subtomentosa, and Helenium autumnale*)? We collaborated with MoBOT and tested the germination rates of 50 seeds per species per storage method. We transplanted the germinated seedlings and tracked their growth over several weeks. Our results show few differences in the number of seeds germinated between species and seed storage treatments. However, we saw significantly different trends in seedling height through time once the seeds were transplanted. *R. subtomentosa* seedlings that were stored in the fridge were taller compared to the other two treatments and this trend continued through time. In contrast, *H. mollis* and *H. autumnale* seedlings that were stored in the freezer were taller through time. This indicates that while species may not show strong differences in germination ability based on storage treatment, their growth and potential long-term viability do. This provides strong evidence that the most effective storage method for these prairie plants is species-specific.

JD Peiffer

Ballwin, MO

Junior
Biomedical Engineering

Sp20-118

Faculty Mentor: Dr. Noel Aloysius, Biomedical, Biological & Chemical Engineering

Temporal-Spatial Analysis of Missouri Weather and its Impact on Water and Natural Resources

J.D. Peiffer, Olivia Bommelje, Julia Peiffer, Sarah Thompson, and Noel Aloysius

Since the onset of industrialization, air temperature over land areas has risen 1.53 ^{0}C, twice as much as the global surface temperature (land and water) increase of 0.87 ^{0}C. Climate change, including changing frequency and intensity of precipitation and extreme heat, severely impacts multiple ecosystem services and public health. In addition, changing weather dynamics makes growing crops and raising animals more difficult, negatively impacting food security worldwide.

Land provides the principal basis for human livelihoods and well-being including the supply of food and freshwater. In Missouri, agriculture, livestock production, and nature-based tourism are large economic drivers; all of which are impacted by vagaries of nature and climate dynamics. Furthermore, land is both a source and a sink of greenhouse gases (GHGs) and plays a key role in the exchange of energy, water and aerosols between the land surface and atmosphere. With increased global temperatures, extreme weather events (including heat waves and droughts) are projected to increase in frequency, complicating food, feed and fuel production and water management worldwide. Such climate-related consequences have been shown to increase rates of agricultural pests and diseases and overall reduce agricultural production. Understanding historical weather changes in Missouri and its interaction with land and water management allows for effective planning for climate adaptation.

Our study aims to establish vulnerabilities of Missouri land use to climate change. We use 40-year daily records of precipitation and temperature from 933 sites and develop a suite of climate change indices that reveal the state-wide picture of trends in extreme events related to temperature and precipitation. Our results will be valuable for planners and policy makers who are involved in Missouri's land and water resources management.
Both of these findings suggest that emerging adults primarily use technology-mediated communication with those relationship partners they see more frequently.

JD Peiffer

Ballwin, MO

Junior
Biomedical Engineering

Sp20-162

Faculty Mentor: Dr. Robert Thomen, Biomedical, Biological & Chemical Engineering

Funding Source: Discovery Fellowship - Honors College

Evaluating a new method for doctors to measure lung function

J.D. Peiffer, Talissa Altes, John Mugler III, Craig Meyer, Jaime Mata, Kun Qing, and Robert Thomen

In Missouri, 7.6 % of citizens have been diagnosed with Emphysema or Chronic Obstructive Pulmonary Disease (COPD), a prevalence higher than other states. Annual costs towards this disease in our state total $666 million. The current method doctors use to visualize lung diseases is nuclear medicine (NM) imaging using an inhaled, radioactive tracer. A different approach to imaging lungs is to use an inert tracer (Xenon) and a MRI procedure. This method uses no radiation and provides higher resolution images within a single 10-15 second breathold. To propel the Xenon MRI method towards regulatory approval by the FDA, we have used computerized methods to compare Xenon MRI and NM lung imaging of the same patients.

59 Subjects (14 healthy, 23 with Asthma, and 22 with COPD) underwent both NM imaging and Xenon MRI generating 59 pairs of images. Images were spatially matched and compared based on percentage of overall lung ventilation and individual pixel agreement. We found a correlation between pixel values in spatially matched images and in overall lung ventilation. In addition, Xenon MRI was able to differentiate between healthy, COPD, and Asthmatic lung images. These results indicated that Xenon MRI provides at least equivalent information to NM imaging. Since it can do this without exposing the patient to radiation, has a shorter imaging time, and produces higher resolution images, we believe Xenon MRI will be a valuable tool in lung imaging. The University of Missouri is one of a handful of locations worldwide with the equipment required for Xenon MRI, positioning Missouri to be a leader in lung imaging research and pulmonary medicine.

JD Peiffer

Ballwin, MO

Junior
Biomedical Engineering

Sp20-165

Faculty Mentor: Dr. Josiah Bryan, Mechanical and Aerospace Engineering

Funding Source: MU College of Engineering

Development of a modular, low-cost, maintainable bionic hand prosthetic device

J.D. Peiffer, Stuart Aldrich, Chris Scully, Jack Allen, Andrew Dove, and Josiah Bryan

Loss of a limb has a profound impact on an individual's activities of daily living. Furthermore, if only one extremity is injured or amputated, overuse of the remaining limb will result in deterioration of joints and muscle. For people living in developing countries cost and maintenance are limiting factors to prosthetic use: the price of a prosthetic can exceed a year's salary, and complex assembly and maintenance limit a user located in rural areas. In this work, we present a low-cost, modular prosthetic hand as a solution to this problem. The palm and main assembly of the prosthetic was 3D-printed using flexible TPU filament and Open Bionics Ada v1.1 design. Housed in the hand is a rechargeable Lithium Polymer battery and readily available power management circuits. To control the fingers, a printed circuit board, using an ATMega32U4 microcontroller, was fabricated to take sensory input from a myoelectric sensor connected to the residual limb of the amputee. Algorithms for "training" the sensor and translating sensor data into movement of the fingers were developed using readily available Arduino libraries. A linear actuator is used to control each finger. Cost of one hand totals $500 dollars with linear actuators taking $350 in total. Initial tests show the hand capable of grasping simple objects such as a bag handle or bottle of water. Attaching the prosthetic to a standard socket will allow for better mechanical understanding of the grip. Compared to commercial designs that can cost up to $50,000, overall cost was kept low, however development of custom servo designs could drastically reduce costs. Maintenance on the hand is expected to be low as all pieces, including the battery, are contained inside the sealed body. Further improvements include incorporating position feedback along with custom sensor integration.

Nicholas Pham
Kansas City, MO

Junior
Food Science and Nutrition

Sp20-52

Faculty Mentor: Dr. Bongkosh Vardhanabhuti, Food Systems and Bioengineering

Funding Source: CAFNR On Campus Research Internship

Improving the Solubility and Emulsification of Pea Protein by Combined Ultrasonication and Complexation with Pectin

Nicholas Pham and Bongkosh Vardhanabhuti

There is a high demand for plant-based foods and beverages. U.S. retail sales for plant-based foods have significantly outpaced overall grocery sales. Evidently, the food industry is racing to develop plant-based food replacements. Soy and wheat proteins have been the basis of many plant-based foods; However, pea protein has recently gained popularity. The major challenge in using pea protein is its low solubility which limits its function in foods. Previous work has reported poor emulsifying ability of pea protein due to its large particle size. In this study, we aimed to improve solubility and emulsification properties of pea protein isolate (PPI) by combined ultrasound treatment and complexation of protein with citrus pectin.

The PPI-pectin solution was prepared by mixing 3% (w/w/) PPI and 0.1 or 0.3% (w/w) pectin at pH 7 and sonicated for 20 min at 60% amplitude. Solution properties were characterized by measuring particle size and surface charge. Untreated or ultrasound-treated PPI or PPI-pectin solutions were then used to form emulsions at pH 5, 6, and 7, and the emulsion properties were determined. Results showed that ultrasound treated PPI-pectin complex had improved solubility and formed better emulsions as shown by decreased droplet size, increased negative charge and increases stability against creaming.

Tito Plaza

St. Louis, MO

Sophomore
Nutrition and Exercise Physiology

Sp20-56

Faculty Mentor: Dr. Sara Gable, Nutrition and Exercise Physiology

An Active Counting and Set Labeling Approach to Ealy Number Learning

Tito Plaza, Gage Crum, Mary Dunleavy, Afiah Mohd Fozi, Katie Frakes, and Sara Gable

Preschoolers' quantitative competencies are predictors of math achievement up to age 15 years and are linked with economic outcomes after high school. This research presents findings from a counting and set-labelling intervention that aimed to move at-risk children more quickly toward cardinal principle knowledge. Cardinal principle knowledge (CPK) is the first conceptual milestone in early mathematical development and acts as a "gatekeeper" to acquisition of later number concepts. Further, attaining cardinal principle knowledge earlier is associated with better future math outcomes. For this project, 58 children in the first year of preschool (average 46 months) were recruited from the CPS Title I Preschool to participate. Children were assessed on their enumeration, verbal counting, cardinal knowledge, numeral recognition, and magnitude comparison abilities. Thirty-six children who scored poorly on the measure of CPK were then randomized, by score, into one of three groups: 1) a sedentary counting and set-labeling intervention; 2) an active counting and set-labeling intervention; or, 3) a no-intervention control group. Children in the first two groups met with an experimenter up to six times over a three- to four-week period. During the first session, children repeated the numeracy assessments and were introduced to the intervention. For sessions two through up to five, children practiced counting and set-labeling. The final session began with a brief intervention session and was followed by post-testing. Children in the no-intervention control group were pre- and post-tested using the same time frame. Data collection is still underway at CPS; analyses will compare children's quantitative competencies across groups and time. Based on past research, we hypothesize that children in the active intervention group will show the largest gains in cardinal principle knowledge when compared to the non-active intervention group and the no-intervention control group.

Jasmine Poole
Florissant, MO

Senior
Psychology

Sp20-156

Faculty Mentor: Dr. Antoinette Landor, Human Development & Family Science

How Racial Discrimination and Colorism Impact Depression and Self-Esteem among Black and Latino College Students

Jasmine Poole and Antoinette Landor

Research has shown that underrepresented students (including minorities, first generation college students, and socioeconomically disadvantaged students) are more likely to face stressors that have a negative impact on their ability to become socially integrated and achieve academic success (Billingsley et. al. 2019). Consequently, when minorities perceive discrimination, they are more likely to have negative mental health outcomes; for instance, more depressive symptoms and lower self-esteem (Breland-Bobble et. al 2012). Previous research suggests that there is a negative relationship between racial discrimination and mental health outcomes and that there is something that needs to be done to extinguish it. Moreover, previous research allows us to focus on the fact that racial discrimination and colorism have detrimental impacts on the mental health outcomes of African Americans and Latinos. The current study will replicate past research but also focus more on how racial discrimination and colorism affect depressive symptoms and self-esteem levels in African American and Latino college students. As we expand this research, we can have a better understanding of how Black and Latino students cope with the depression and colorism and how they can improve their overall wellbeing.

Sarah Pribe

St. Louis, MO

Senior

English; International Studies

Sp20-158

Faculty Mentors: Dr. Michael Marlo, English; Dr. Rebecca Grollemund, LInguistics

Funding Source: ASH Scholars

Tone Neutralization in Bukusu and Soba Languages

Sarah Pribe and Michael Marlo

The Gisu language is part of the Luyia language family and is spoken in eastern Uganda by more than 2 million people. Within Gisu there are six dialects, Soba, Teza, Yobo, Fumbu, Walasi, and Hugu, which are understudied and underdocumented. All six dialects are closely related to the Kenyan Luyia language of Bukusu. Of these dialects, Soba is spoken in the far eastern town of Mbale on the border with Kenya, closest to the area where Bukusu is spoken. The data used in this study was collected by the author in Mbale in June 2018. This study compares the tonal systems of Bukusu and Soba, observing that Soba words consistently have High tones at the beginning of words that lack any High tones in Bukusu and other Luyia languages in the region. The addition of High tone in these words in Soba has neutralized what was historically two distinct tonal categories of words. Previously, work done on historical changes in Luyia tone systems has been focused on verbs, however this study incorporates both nouns and verbs in order to get a more holistic analysis of the change between Bukusu and Soba. This analysis is important to the field of linguistics because there has been little study done on tone in northern Luyia languages, and very little on Ugandan Luyia languages, so by investigating Soba a more detailed understanding of tonal changes in the language cluster can be gained.

This research was done with Dr. Marlo through the Arts, Social Sciences, and Humanities Research Program at the University of Missouri-Columbia.

Adrienne Pyeatt

Rolla, MO

Sophomore
Psychology; Statistics

Sp20-179

Faculty Mentors: Dr. Michael Marlo, English; Dr. Rebecca Grollemund, LInguistics

Funding Source: ASH Scholars

Documenting Luyia Together: Talking Wordlists

Adrienne Pyeatt, Sophie Kennedy, Carrick O'Bleness, Rebecca Grollemund, and Michael R. Marlo

This presentation describes research activities of the ASH Scholars research team *Documenting Luyia Togethe*r during the 2019-2020 academic year on our Luyia-Soga Talking Wordlists subproject. The overall goal of our team is to describe and document languages of the Luyia cluster spoken in Kenya and Uganda. These languages belong to the Bantu linguistic group that counts approximately 500-600 languages spoken in sub-Saharan Africa. Within Luyia, we can distinguish several language varieties such as Nyore, Saamia, Khayo, and Tsootso. The language varieties in the region are underdocumented in the sense that most lack much published research about their linguistic properties, and few have been the subject of grammatical descriptions, dictionaries, or collections of oral literature.

Our subteam has focused on processing linguistic materials collected from speakers of 14 languages from the Luyia cluster and from the Soga cluster of language to the west of the Luyia varieties. The materials include a set list of about 600 words written in the language, an English translation, and an audio recording with pronunciations of each of the words on the list from a speaker of the language. Our work has been to process the audio recordings of an interview with the speaker using the Audacity software package. We extract example pronunciations from the longer interview recording and then link individual audio files to the corresponding entries in the wordlist.

Our talking wordlists serve as a precursor to a written lexicon for the language, providing pronunciations and definitions for a variety of classes and types of words. They facilitate the study of prominent features of the languages, such as phonology and morphology. Moreover, the lists allow for the comparison of the languages in the cluster to determine the relatedness of the languages and to establish a language classification and family tree.

Eric Queathem

Montgomery City, MO

Senior

Nutrition and Exercise Physiology; Biochemistry

Sp20-32

Faculty Mentor: Dr. Victoria Vieira-Potter, Nutrition and Exercise Physiology

Funding Source: McNair Scholars Program

Beta3-Adrenergic Receptor (B3AR) Activation Induces Estrogen Receptor Beta (ERb) and Improves Mitochondrial Metabolism in Adipocytes

Eric D. Queathem, Rebecca Welly, Dennis Lubahn, R. Scott Rector, Laura Clart, Kevin Fritsche, and Victoria Vieira-Potter

In vivo, ERb activation protects against obesity and white adipose tissue (WAT) dysfunction. Mechanisms are unknown, but we hypothesize that it involves adipocyte-specific mitochondrial activity via induction of OXPHOS and UCP1–proteins that characterize WAT "browning," a process sufficient to rescue metabolic dysfunction. In cancer cells, increasing mitochondrial ERb increases OXPHOS transcription and mitochondrial activity via a mechanism requiring mitochondrial transporter, GRP75. We sought to determine whether this mechanism applies to adipocytes in vitro, and the potential in vivo implications. In wild type (WT) mice, the adipocyte-specific B3AR ligand, CL316,243 (CL) induced WAT UCP1 and ERb protein (Western blot), and GRP75 mRNA (qPCR) (all n=10/grp, $P<0.05$). In primary adipocytes from WT mice (n=3/treatment), CL increased UCP1 (~2-fold; $P<0.05$) and ERb protein (~4-fold; trend, $P=0.097$). In vivo, we show that adipocytes harvested from mutant mice missing ERb DNA binding domain (ERbDBDKO) display suppressed mitochondrial O2 consumption (via Oroboros; n=6-8/grp, $P<0.05$). We next tested whether ERbDBDKO mice would have impaired exercise-induced WAT browning. Remarkably, unlike WT (~3-fold UCP1 increase; $P<0.05$), ERbDBDKO mice were nonresponsive to exercise induction of UCP1 protein in WAT. Taken together, our data support a critical role for adipocyte ERb in mediating lipolysis driven mitochondrial responses. We hypothesize that the mechanism involves GRP75. Identifying the mechanism by which ERb enhances adipocyte mitochondrial activity has enormous potential to treat a spectrum of metabolic diseases.

Dawson Quinn

Chesterfield, MO

Senior

Psychology; Human Development and Family Science

Sp20-130

Faculty Mentor: Dr. Rachel Thibodeau-Nielsen, Human Development & Family Science

Effects of School Sex Education on Post-Adolescent Romantic Relationships

Dawson Quinn and Rachel Thibodeau-Nielsen

Research on sex education focuses on differences between abstinence-only and comprehensive programs and their effects. According to research, comprehensive sex education is negatively correlated with teen pregnancy, whereas abstinence-only education had no effect on reducing sexual encounters at a young age (Kohler, Manhart, & Lafferty, 2008). Additionally, research on relationship violence finds correlations between early sexual behaviors and sexual abuse; according to Homma and colleagues (2012), adolescent sexual behaviors, especially involving abuse, can influence sexual behavior in teens (Homma et. al, 2012). Furthermore, sexual violence is found to be associated with teen pregnancy, and the effects of these are further influenced by experience with child abuse (Logan, Holcombe, Ryan, Manlove, & Moore, 2007). Yet, few studies examine whether there is a direct correlation between presence of sex education – or what kind of education, if present – and relationship/sexual violence. The proposed study explores the association of sex education to post-adolescent relationships with an emphasis on relationship abuse.

A Qualtrics survey was distributed among students at the University of Missouri – Columbia. The survey was completed online and asked characteristic questions about each participant, including age, gender identity, sexual preference, and race/ethnicity. Following were questions about the extent of each participant's experience with sex education in school. In addition, information about participants' romantic relationships was gathered, including information on abuse. Following the survey, students were thanked for participation and provided resources for sexual health, relationship violence, sexual assault, and contraceptive use. Students who completed the study were entered in a raffle to win a gift card.

Data collection is completed and undergoing analyses. An ANOVA test is being used to determine correlations.

Our findings will contribute to the knowledge of effects of sex education on adolescents. This will be beneficial not only for further research, but for schools to know how best to contribute to the well-being of students. Greater knowledge of sex education will help children make safe decisions about their sexual endeavors and reduce the likelihood of abuse, unwanted pregnancy, and STIs.

Daniella Reyes

Chicago, IL

Freshman
Psychology

Sp20-134

Faculty Mentors: Dr. Amanda Rose, Psychological Sciences; Dr. Ashley Groh, Psychological Sciences

Funding Source: Undergraduate Research Scholars for Psychological Sciences

Coping Strategies in Adolescents: Gender Differences and Implications for Adolescent Health

Daniella Reyes, Amanda Rose, Ashley Groh, Sarah Borowski

Coping strategies have important implications for adolescent health, including friendship adjustment, emotional well-being, and physical well-being. In terms of friendship adjustment, adolescents who use active coping strategies are more likely to have positive friendship quality (Shin & Ryan, 2012). Research also finds that coping strategies have implications for emotional adjustment, such that adolescents using avoidance coping are more likely to be isolated and anxious (Shin & Ryan, 2012). In terms of physical health, avoidant coping styles have been linked to negative physical health (Wilson et al., 2005). There is also evidence that the association between coping styles and well-being vary depending on gender (Wilson et al., 2005). In the current study, we will examine adolescents' coping in relation to their well-being and whether the relations differ for girls and boys. Participants are friends in 8th, 9th, and 10th grades and were asked to complete survey questionnaires. They completed the Brief COPE (Carver, 1997), which assesses coping strategies. For example, items assess active coping (i.e. taking actions to fix the situation) and avoidance coping (i.e. denying the situation exists). The adolescents also completed the Friendship Quality Questionnaire (Rose 2002 revision of Parker and Asher 1993). To assess emotional well-being, adolescents completed the Multidimensional Anxiety Scale for Children (March et al., 1997) and the Center for Epidemiological Studies Depression Scale (Eaton et al., 2004). The Short Form (36) Health Survey (RAND Health; and.org) was used to assess physical well-being. Correlational analyses will examine the relations between coping and well-being. T-tests will be used to compare girls and boys in their coping and well-being. Correlational analyses will also test whether there are gender differences n the associations between coping strategies and well-being.

Caleb Ridings

Lee's Summit, MO

Freshman

Philosophy; Political Science

Sp20-168

Faculty Mentor: Dr. Michael Marlo, English

Funding Source: ASH Scholars

Documenting Luyia Together: Interlinear Analysis of Bukusu Texts

Caleb Ridings, Miya Russell, Rebecca Grollemund, and Michael Marlo

This presentation describes research analyzing the Bukusu language as part of the ASH Scholars research team *Documenting Luyia Togethe*r during the 2019-2020 academic year. Our joint effort contributes to the documentation of Bukusu, a member of the Luyia language cluster in western Kenya. The 2019 Kenyan census identified about 1.2 million members of the Bukusu ethnic community, although it is unknown how many speakers of the language there are. The work of the 2018-2019 ASH Scholars team led to a major expansion of a linguistic corpus of the Bukusu language, as 90 additional folk tales collected by anthropologists in the 1930s and the 1960s were imported into the Fieldworks Language Explorer (FLEx) database. The imported texts included a written representation of the Bukusu story along with word-by-word and sentence-by-sentence translations into English. This year, we set to work analyzing each text linguistically to break up each word in a text into its prefixes, suffixes, and roots. Some of the initial work this year included restoring files that had been corrupted in the transfer to our FLEx database, before moving on to analysis of the repaired texts. We also worked to reconcile differences in spelling between the collection of texts from the 1930s and more modern spellings. Together, we have analyzed 40 texts over the course of the academic year, 39 of which are now at least 95% analyzed. Overall, this has provided us with 1,361 individual lines of analyzed texts. The analyzed texts will be used to examine the grammatical structures of the Bukusu language, and to compare it to other members of the Luyia language cluster that we are studying in our research.

Lillian Risse
St. Louis, MO

Senior
Biological Sciences

Sp20-30

Faculty Mentor: Dr. Manuel Leal, Biological Sciences

Motor Self-Regulation in *Anolis evermanni*

Lillian Risse and Manuel Leal

The ability to motor self-regulate is one of many benchmarks that can be used to evaluate and compare the cognitive abilities of different animal taxa. Motor self-regulation refers to the ability of an animal to modify a natural behavior in order to solve a task, often involving retrieving a food reward. In this study, I assessed the motor self-regulation ability of *Anolis evermann*i. As sit and wait predators, *A. evermanni*, commonly known as emerald anoles, are triggered to strike prey after visual perception of movement. This results in a foraging style characterized by a singular, quick, fluid movement. Refrainment from this strike behavior is evidence of the ability of *A. evermanni* to motor self-regulate. To assess this ability, I presented the anoles with a detour task. To successfully attain a food reward, anoles had to detour a clear barrier and approach the cricket from the side. In this study, five female and four male emerald anoles were tested for their ability, measured in test latency, number of mistakes over trials, and total trials required to successfully complete the task. Not only were all subjects able to detour the barrier, but they also were eventually able to complete the task with no or minimal contact with the barrier. These findings suggest that *A. evermanni* are capable of motor self-regulation.

Rachael Robinson
O'Fallon, MO

Senior
Psychology

Sp20-9

Faculty Mentor: Dr. Ashley Groh, Psychological Sciences

Funding Source: ASH Scholars

Examining Antecedents of Maternal Caregiving Behaviors using SEM Models

Rachael Robinson, Nanxi Xu, and Ashley M. Groh

This project examines maternal psychological and contextual antecedents of mothers' parenting behaviors using structural equation modeling (SEM). Commonly assessed antecedents include mothers' attachment representations (Behrens et al., 2016), maternal psychopathological symptoms (Alvarenga et al., 2013), SES (Callahan & Eyberg, 2010), and stressful life events (Smith et al., 2014). Although previous research has identified important antecedents contributing to maternal caregiving behavior, the majority of this research has focused on maternal sensitivity. In our previous project, we examined the underlying factor structure of maternal parenting behaviors across (non)distressing caregiving contexts using SEM models. We found that these behaviors loaded on two factors: negative intrusiveness and emotional detachment, and that negative intrusiveness was heightened by the distressing caregiving context. The current project examines how different antecedents are related to these parenting latent factors. The sample for this study comprises 142 mothers and their 6-month-old infants. Maternal parenting behaviors were observed during a free play and the reunion episode of the Still Face Procedure (SFP; Tronick et al., 1978). Interactions were coded across multiple dimensions (e.g., sensitivity, detachment, intrusiveness). Maternal risk factors and contextual risk factors were collected using interviews and self-reports. Data collection is complete and analyses will be complete by early April. Results are expected to indicate that mothers' anxiety will be positively associated with negative intrusiveness and that mothers' depression will be positively associated with emotional detachment (Alvarenga et al., 2013). Results are also expected to indicate that mothers' attachment insecurity, low SES, and greater number of stressful life events will be positively associated with both latent factors (Behrens et al., 2016; Callahan & Eyberg, 2010; Smith et al., 2014).Findings from the study will provide evidence supporting the use of formal models that best capture underlying variation in caregiving behavior and considering multiple parenting dimensions in investigations of parent-child relationships.

Danielle Rock

Lee's Summit, MO

Senior
Psychology

Sp20-133

Faculty Mentor: Nicole Dr. Ashley Groh, Psychological Sciences

Mother-Child Conversations about Past Emotional Events: Links with Mothers' Attachment Representations and Children's Socioemotional Adjustment

Danielle Rock and Ashley Groh

Research indicates that the way mothers discuss past emotional events with children is associated with positive outcomes in children's cognitive development. Given such evidence, it is important to identify antecedents of mothers' elaborative reminiscing. Little is known about whether the role of mothers' history of caregiving experiences—reflected by attachment representations—is related to reminiscing style. It might be expected that how mothers talk about these events will be associated with children's social (i.e., social competence) and emotional (i.e., externalizing and internalizing problems) development. Thus, we examined the role of mothers' attachment representations in predicting maternal reminiscing and the significance of maternal reminiscing for child socioemotional outcomes. The sample comprised 66 mother-toddler dyads. The dyads were video recorded while talking about emotional events in the laboratory. Mothers were instructed to talk to their toddlers about an event in which the child was hurt, an event in which the child was scared, and an event in which the child was happy as they normally would. The videos were transcribed verbatim by research assistants for coding. Mothers completed the Attachment Script Assessment (ASA) to assess attachment representations and the Brief Infant Toddler Social and Emotional Assessment (BITSEA) to assess children's social competence and behavioral problems. Data collection is complete and the ASA and BITSEA are reduced. Correlations will be used to examine associations among variables. Higher levels of attachment security as assessed with the ASA are expected to be associated with more elaborative reminiscing. Moreover, higher levels of maternal elaborative reminiscing are expected to be associated with greater socioemotional competence in children, including higher social competence and fewer behavioral problems. Findings from this study will advance understanding of the antecedents and developmental significance of mothers' elaborative reminiscing style when discussing emotionally significant past events with children.

Matthew Rockey

Chicago, IL

Junior
Psychology

Sp20-184

Faculty Mentor: Dr. Prasad Calyam, Electrical Engineering & Computer Science

Funding Source: College of Engineering Program Undergraduate Research Option

Cyber Range: Research-inspired Learning of ‚'Attack Defense by Pretense,' Principles and Practice

Matthew Rockey, Komal Vekaria, Songjie Wang, and Prasad Calyam

Abstract withheld due to proprietary permissions.

Austin Rucker

Pleasant Hill, MO

Senior
Political Science

Sp20-69

Faculty Mentor: Dr. Jonathan Krieckhaus, Political Science

Social Welfare Spending Good or Bad? An examination of the OECD Countries

Austin Rucker and Jonathan Krieckhaus

This project examines the theory that social welfare spending creates benefits to citizens. I specifically test three hypotheses. (1) Welfare spending increases budget deficits. (2) Greater spending on welfare programs decreases inequality between social classes. (3) The type of welfare state has an effect on the quality of life. The first relationship examined is between social welfare spending and central government debt in 2010. The second relationship examined is between social welfare spending and inequality as measured by the Gini coefficient in 2010. The third hypothesis focuses on types of welfare state and life quality variables: life expectancy, long term unemployment rate, long term employment rate, and overall life satisfaction. The findings show that social welfare spending does not have statistically significant relationships with central government debt or inequality. The findings do show that the life quality variables do vary between the type of welfare state, however not at a statistically significant level.

Miya Russell

O'Fallon, MO

Sophomore
LInguistics; Anthropology

Sp20-166

Faculty Mentors: Dr. Michael Marlo, English; Dr. Rebecca Grollemund, LInguistics

Funding Source: ASH Scholars

Documenting Luyia Together: Interlinear Analysis of Bukusu Texts

Miya Russell, Caleb Ridings, Rebecca Grollemund, and Michael Marlo

This presentation describes research analyzing the Bukusu language as part of the ASH Scholars research team Documenting Luyia Together during the 2019-2020 academic year. Our joint effort contributes to the documentation of Bukusu, a member of the Luyia language cluster in western Kenya. The 2019 Kenyan census identified about 1.2 million members of the Bukusu ethnic community, although it is unknown how many speakers of the language there are. The work of the 2018-2019 ASH Scholars team led to a major expansion of a linguistic corpus of the Bukusu language, as 90 additional folk tales collected by anthropologists in the 1930s and the 1960s were imported into the Fieldworks Language Explorer (FLEx) database. The imported texts included a written representation of the Bukusu story along with word-by-word and sentence-by-sentence translations into English. This year, we set to work analyzing each text linguistically to break up each word in a text into its prefixes, suffixes, and roots. Some of the initial work this year included restoring files that had been corrupted in the transfer to our FLEx database, before moving on to analysis of the repaired texts. We also worked to reconcile differences in spelling between the collection of texts from the 1930s and more modern spellings. Together, we have analyzed 40 texts over the course of the academic year, 39 of which are now at least 95% analyzed. Overall, this has provided us with 1,361 individual lines of analyzed texts. The analyzed texts will be used to examine the grammatical structures of the Bukusu language, and to compare it to other members of the Luyia language cluster that we are studying in our research.

Jarrod Russo

St. Louis, MO

Junior
Biological Sciences

Sp20-140

Faculty Mentor: Dr. Jamie Arndt, Psychological Sciences

Funding Source: ASH Scholars

The Art of Death: The Effects of Viewing Artistic Paintings of Death on Satisfaction with Life

Jarrod Russo, Cassie Draudt, Javier Cuenca, Peter Helm, and Jamie Ardnt

Mortality related themes have been the subject of art for thousands of years. Death has been represented both as positive and negative, as an end and as a beginning, even as a personified being. A prominent theory in psychology, Terror Management Theory (TMT; Greenberg et al., 1986), suggests awareness of one's inevitable death is a driving force behind a wide range of human behavior. Studies (Routledge et al., 2010) have found, for example, that reminding individuals of their mortality can decrease people's satisfaction with life (SWL). Some research has used graphic imagery to activate death-related cognitions and elicit defensive reactions. However, it remains untested whether the emotional content of death-related imagery – specifically as presented in artistic paintings - differentially influences people's psychological reactions. To assess this question, we conducted a pilot study, (*N = 836*) in which we selected 225 paintings that portrayed death as relatively positive or negative. Participants evaluated these paintings on various dimensions including how much they evoked thoughts of death as well as positive and negative emotions. We selected paintings that equally evoked thoughts of death but differed in their emotional content. In a second study (*N = 513*) participants were randomly assigned to one of four conditions: viewing paintings portraying death with negative emotions, paintings portraying death with mixed emotions (both positive and negative), writing about the thoughts and emotion evoked by death, and a control condition. Participants then completed a measure of SWL and demographic questionnaires. Results indicate that paintings portraying death with mixed emotions led to greater SWL than did the other conditions. This effect was moderated by participant education, such that death paintings containing mixed emotions increased SWL primarily among those with less formal education. Other effects, implications, and future directions are discussed.

Stephanie Sage

St. Peters, MO

Junior
Agriculture

Sp20-172

Faculty Mentor: Dr. Paula McSteen, Biological Sciences

The lateral suppressor1 (las1) mutant inhibits axillary meristem initiation and shows a complex genetic interaction with the meristem maintenance mutant compact plant2 (ct2) in maize

Stephanie Sage, Norman B. Best, and Paula McSteen

Zea mays (maize) develops in growing points called meristems that form and divide new cells. The *lateral suppressor1* (*las1*) mutant is defective in axillary meristem initiation and encodes a GRAS transcription factor. This novel *las1* mutant produces barren stalks and fails to develop female inflorescences for reproduction. The *compact plant2* (*ct2*) mutant is a semi-dwarf with a fasciated ear phenotype and increased spikelet density in male inflorescences. The *ct2* gene regulates the maintenance of the shoot apical meristem (SAM) and acts in the *clavata* pathway. Producing l*as1; ct2* double mutant will enable us to test how the *las1* gene, which is responsible for axillary meristem initiation, is affected by altering meristem maintenance. Data was collected for ear number, tassel length, branch number, and plant height for quantitative analysis and statistical comparison. The *ct2* mutant partially suppresses the barren stalk *las1* phenotype, suggesting that las1 is also involved in maintenance of axillary meristems. However, the *las1* mutant suppresses the *ct2* mutant's increase in tassel branch number. This indicates that *las1* is involved in the initiation and/or maintenance of axillary meristems during reproductive development. These results indicate a developmentally specific complex genetic interaction between initiation and maintenance to control axillary meristem development. The *fasciated ear4* (*fea4*) gene is also involved in meristem maintenance and encodes a bZIP transcription factor. A double mutant analysis with *fea4* and *las1* is being analyzed and will further confirm the las1 involvement in the meristem maintenance pathway. In summary, these results provide evidence that las1 functions in axillary meristem maintenance in as well as initiation in a developmentally specific manner.

Muhammad Salim
Columbia, MO

Senior
Biomedical Engineering

Sp20-78

Faculty Mentor: Dr. Aaron Stoker, Orthopaedic Surgery

Correlations Among Articular Cartilage Biomechanical Properties and Metabolic, Biomechanical and Histomorphometric Characters of Subchondral Bone From Osteoarthritic Knees

Muhammad H. Salim, Hayley G. Ockerhausen, Matthew Z. Gao, Tyge J. Ortega, Ashwin Garlapaty, Conner B. Schmid, Chantelle C. Bozynski, James A. Keeney, James L. Cook, and Aaron M. Stoker

INTRODUCTION: Osteoarthritis (OA) is a multifactorial disease often progressing from an initial injury to whole-joint inflammation and degeneration causing pain and dysfunction. This study was designed to determine how the biomechanical properties of articular cartilage correlate with various properties of the underlying bone. It was hypothesized that there would be important correlations among these assessments of articular cartilage and subchondral bone from osteoarthritic knees.

METHODS: With IRB approval, excised knee articular surfaces were collected from eight patients undergoing TKA. Explants were created, and the cartilage was separated from the bone, and biomechanical properties were determined. Bone explants were cultured, and media were used for biomarker analysis. Bone explant biomechanical and histomorphometric properties were determined. A spearman correlation was performed to determine relationships between cartilage and bone properties.

RESULTS: The data from this study indicate that as cartilage permeability increased and fiber modulus decreased, bone area increased. Additionally, as cartilage fiber modulus decreased and ground substance modulus increased, there were associated increases in release of degradative and pro-inflammatory biomarkers by underlying bone explants. Further, as cartilage fiber modulus decreased, the release of bone-turnover biomarkers increased.

CONCLUSION: The results of this study suggest that the relationships between cartilage and underlying bone in OA are complex and multifaceted. Ongoing studies in our laboratory are aimed at further characterization of these complex interactions during development and progression of OA towards better defining disease mechanism and targets for effective interventions.

Kaitlyn Sawyer
Joliet, IL

Senior
Political Science; Economics

Sp20-80

Faculty Mentor: Dr. Jonathan Krieckhaus, Political Science

The Political Economy of Urban Standard of Living

Kaitlyn M. Sawyer and Jonathan Krieckhaus

This research thesis investigates if government policy affects the living standards of a community. The specific research question is - does an increase in public investment expenditure lead to positive living standards. Positive living standards are measured as a decrease in violent crime statistics, small businesses "birthed" per capita, and unemployment rates. These statistics are comprised by US state level data. I theorized that a higher level of public investment will result in more job opportunities, that will lead to lower crime rates, more economic investment from community members, in terms of small businesses birthed. To aggregate more comprehensive results, public investment was broken down into categories of highway spending, school spending and public investment as a whole. The research was conducted through the usage of a regression analysis of the relationship between the independent variable of public investment and the dependent variables of violent crime statistics, small businesses birthed, and unemployment statistics. The results of the research did not confirm my theory. Rather, there was little to no correlation between public investment and violent crime statistics and unemployment rates. The relationship between public investment and small businesses showed an inverse relationship, where public investment decreased the amount of small businesses that were birthed during the time frame.

Rose Schauffler

Raytown, MO

Senior
Biomedical Engineering

Sp20-181

Faculty Mentor: Dr. Trent Guess, Physical Therapy

Motion, Muscle Activation, and Violinists

Rose Schauffler and Trent Guess

String musicians are particularly susceptible to orthopedic conditions such as overuse syndrome, muscle tendon syndrome, focal dystonia, hypermobility syndrome, and compressive neuropathy. There is a need to analyze the movements performed by string players to determine ideal playing techniques and facilitate development of an ergonomically correct instrument setup. A motion capture system (Vicon) and upper extremity model analyze joint angles, forces, moments, and power of the shoulders and arms while playing the violin. In addition, electromyography (EMG) data from select muscle groups including the biceps, triceps, trapezius, supraspinatus, infraspinatus, and lumbar erector spinae provide information on muscle activations during violin playing. These data sets have been analyzed in various studies for trends in kinematics, kinetics, and muscle activation patterns. Ideally, subjects are professional or collegiate players who practice and perform regularly without major injuries. A literature review of such studies will be paired with a theoretical data collection strategy to determine common patterns of motion that limit muscle fatigue and prevent injuries. Trends in the data prove useful for optimizing teaching techniques in secondary and collegiate string education.

Angela Schlaker

St. Louis, MO

Freshman
Communication

Sp20-174

Faculty Mentors: Dr. Michael Marlo, English; Dr. Rebecca Grollemund, LInguistics

Funding Source: ASH Scholars

Documenting Luyia Together: Marachi Talking Dictionary

Angela Schlaker, Olivia Watt, Rebecca Grollemund, and Michael R. Marlo

This presentation describes research to develop the first talking dictionary of the Marachi language as part of the ASH Scholars research team *Documenting Luyia Together* during the 2019-2020 academic year. Our joint effort contributes to the documentation of Marachi, a member of the Luyia language cluster in western Kenya. The 2019 Kenyan census identified about 65,000 members of the Marachi ethnic community, although it is unknown how many speakers of the language there are. Marachi is an underdocumented language, with very few prior publications or research on the language, and no published dictionary to date. Our research builds on an effort by Dr. Michael Marlo in 2012 to collect Marachi dictionary materials from a speaker of the language. Prior research generated a list of about 4000 words with corresponding translations and around 4500 sound files with pronunciations of those words. In Fall 2019, we added an identification number and spelling of the word in Marachi to the file names of the sound files in order to link the sound files with the dictionary entries to create the first talking dictionary of the language. We also helped edit the audio archive and the dictionary by checking all of the sound files to ensure that they represented words in the dictionary. In some cases, we found sound files with no pronunciations inside, so we removed those files from the archive. In other cases, we found words to add to the dictionary and translations to update. Our work helps to ensure that the language is preserved and documented and supports future research efforts on the language and the development of pedagogical materials for the teaching of the language in schools.

Madison Schroder

St. Louis, MO

Senior

Political Science; Religious Studies

Sp20-91

Faculty Mentor: Dr. James Endersby, Political Science

Voter Turnout for Native Americans Living on Reservations

Madison Schroder and James Endersby

Existing research on voter turnout for minority groups in America to develop policy and societal reform to include the perspective and scope of the needs of important members of society frequently focuses on that of African American and Hispanic populations. However, research on voter turnout for the American Indian population is far less expansive. Lack of this research diminishes the opportunity for improvements to be made, and therefore further perpetuates the critical issues; including lack of education, high poverty levels, and the deficiency of social welfare programs. This research examines causes for Native American voter turnout for those living on reservations by using data from four states; South Dakota, Oregon, Arizona, and Michigan, as well as the incorporation a historical analysis of the relationship between Native Americans living on reservations and state and federal governments and how it has affected the American Indian vote. The voter data for this project was accumulated using different state or municipal resources for the 2016 elections from each of the states selected and compared to several different socioeconomic variables such as voting-age population, poverty rates, and educational attainment. I hypothesized that the leading variables for the lack of voter turnout are the high poverty rates and high unemployment rates among Native Americans living on reservations, but the findings of this research focus primarily on the institutional barriers to obtaining the data that make this research possible and impactful.

Christine Schulze
Belle, MO

Senior
Psychology

Sp20-183

Faculty Mentor: Dr. Amanda Rose, Psychology; Dr. Ashely Groh, Psychology; Sarah Borowski, Psychology

Funding Source: ASH Scholars

Adolescents' Emotional and Physiological Reactivity to Positive and Negative Friendship Interactions

Christine Schulze, Gabrielle Scott, Caroline Davey, Sarah Borowski, Ashley Groh, and Amanda Rose

Friendship interactions have important implications for adjustment during adolescence (Furman & Rose, 2015). Adolescents' negatively-focused problem talk with friends is linked to increases in depressive symptoms (e.g., Schwartz-Mette & Rose, 2012) whereas talking to friends about positive life events has been linked to lower depressive symptoms (Smith, 2015). Less is known, however, about adolescents' reactivity to friendship interactions. The current study examines adolescents' emotional and physiological reactivity to both positive and negative valence interactions with friends. Participants were 8th-10th graders who participated with a same-gender friend. For the negative valence task, the friends discussed a personal problem together for sixteen minutes. For the positive valence task, the friends planned a party together for seven minutes.

To assess emotional reactivity, adolescents reported on positive and negative emotions using the Positive and Negative Affect Scale (PANAS; Watson, Clark, and Tellegen, 1988). PANAS surveys were administered before and after each task to assess changes in the participants' emotional states. Participants indicated how much they currently felt positive emotions (e.g., happiness) and negative emotions (e.g., hostile) on a scale of 1 (not at all) to 5 (very much so).

To assess physiological reactivity, respiratory sinus arrhythmia (RSA) was measured using heart rate sensors and a respiration belt. A resting baseline was collected by asking participants to sit quietly and clear their minds for three minutes before each task. RSA was measured continuously during each interaction task. The physiological data was edited and reduced into 30-second segments using MindWare. For analyses, average RSA scores were computed for each baseline (pre-task) assessment and were averaged across both the valence tasks.

Paired t-tests were used to assess changes in adolescents positive and negative emotions as well as RSA activity from before to after each task.

Gabrielle Scott

Belle, MO

Senior
Psychology

Sp20-147

Faculty Mentor: Dr. Amanda Rose, Psychology

Funding Source: ASH Scholars

Adolescents' Emotional and Physiological Reactivity to Positive and Negative Friendship Interactions

Gabrielle Scott, Caroline Davey, Christine Schulze, and Amanda Rose

Friendship interactions have important implications for adjustment during adolescence (Furman & Rose, 2015). Adolescents' negatively-focused problem talk with friends is linked to increases in depressive symptoms (e.g., Schwartz-Mette & Rose, 2012) whereas talking to friends about positive life events has been linked to lower depressive symptoms (Smith, 2015). Less is known, however, about adolescents' reactivity to friendship interactions. The current study examines adolescents' emotional and physiological reactivity to both positive and negative valence interactions with friends. Participants were 8th-10th graders who participated with a same-gender friend. For the negative valence task, the friends discussed a personal problem together for sixteen minutes. For the positive valence task, the friends planned a party together for seven minutes.

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Paired t-tests were used to assess changes in adolescents positive and negative emotions as well as RSA activity from before to after each task.

Aleks Shin

Columbia, MO

Senior
Health Science

Sp20-62

Faculty Mentor: Dr. Kuanysh Kabytaev, Pathology and Anatomical Sciences

Liquid Chromatography Mass Spectrometry Assay for Quantitation of Human Insulin

Aleks Shin, K. Tawiah, S. Connolly, and K. Kabytaev.

Human insulin is a peptide hormone which has a crucial role in regulating blood glucose. Monitoring insulin levels in patients can give diagnostic data regarding insulin resistance and pancreatic function. Insulin control is especially important in treating and diagnosing diabetes and medical conditions. Aptamers are short, single DNA or RNA strands that bind with high selectivity and specificity to molecular targets such as peptides and proteins. Isotope dilution is established as a gold standard for quantitation of biomarkers. Presented here is a high-performance liquid chromatography/mass spectrometry method enhanced by isotope dilution and aptamer enrichment for quantitation of human insulin. A QTRAP 6500+ (Sciex) coupled to a Shimadzu HPLC system was used. For selected ion monitoring the +5 and +6 ions were chosen. Calibration curves were generated from serial dilution of native and isotope labeled insulin. In summary, we have developed a novel method for quantitating human insulin using LC-MS.

Rebecca Shyu

Columbia, MO

Sophomore
Computer Science

Sp20-111

Faculty Mentor: Dr. Bih-Ru Lea, Business and Information Technology at the Missouri University of Science & Technology

Funding Source: Discovery Fellowship - Honors College

Geospatial Mapping of Access to Centralized Health Care in Missouri

Rebecca Shyu, Timothy Haithcoat, Mirna Becevic, and Bih-Ru Lea

Introduction: One of the most significant barriers for Missourians is a lack of timely and quality access to health care services. It depends on many factors: social, economic, and demographic, but the main concern remains centered around the lack of a public transportation system in rural Missouri. The Show-Me ECHO (Extension for Community Health care Outcomes) Project, at the University of Missouri's Missouri Telehealth Network, was implemented to increase the capacity of providers in rural areas via telemedicine technologies.

Methods: Our first step was to compile a list of providers that had prescriber credentials in the state of Missouri. This included their addresses and the ECHOs they were participating in. Next, we used ESRI's ArcGIS StreetMap resource to create a road network dataset and address geolocator. We focused on Primary Roads to analyze common accessibility and efficiency. Once the time aspect was added to the roads and the network was ready, we geolocated the health center locations. Out of the 507 addresses, we successfully geocoded 414 addresses. Then, we used the Network Analyst tool to find routes from every health center to the University of Missouri hospital, the "Golden Standard."

Results: We mapped every route for all children related ECHOs: all Asthmas (Asthma, Asthma Care & Education, and Asthma Care Accelerator), Autism, and Child Psychology. The average time traveled was 112.71 minutes (1.89 hours). When we mapped every route for adult ECHOs, the average time was similar: 110.12 minutes (1.84 hours). The furthest location took 276.31 minutes (4.61 hours).

Discussions: By mapping the locations, the Missouri Telehealth Network is able to visualize the reach and identify areas that could use more outreach. It sheds light on the barrier for rural Missourians, who will not always choose traveling 4.61 hours to access proper health care.

Heather Silvey
Columbia, MO

Senior
Communication; Psychology

Sp20-10

Faculty Mentor: Dr. Christopher Josey, Communication

Body Type Idealization on Instagram and its Effects on Body Image and Self Concept

Heather Silvey and Christopher Josey

Purpose: American's usage of social networking sites has increased exponentially over the past decade (Kaiser, 2010). Increasingly social network consumers are turning to services that are image-centric. Research demonstrates that mediated images pose risks for consumers. In particular, studies show that images may affect viewers' mental health, self-concept, and body-image (Harrison, 2000; Wertz Garvin & Damson, 2008). To date, most findings within this area emerged from the study of traditional media forms (e.g., television) (Becker, 2004; Harrison & Cantor, 1997). The few modern studies that exist largely focus on multi-use social networks (e.g., Facebook) (Cohen, Irwin, Newton-John, Slater, 2018; Prichard, McLachlan, Travis, & Tiggemann, 2018). Such studies investigate how images promoting a thin-ideal effect consumers (particularly women). Relatively few studies have investigated how image centered social media platforms effect men. Fewer still have examined how the exaggerated hourglass figure trend may affect body and self-esteem in women. This study fills this gap within the extant literature by studying the negative effects of idealized muscular (men) and exaggerated hourglass (women) figures on consumers of imaged based social media. Particular attention is paid to the effects of these images on overall self and body esteem.
Procedure: An experiment utilizing a 2x3 factorial design (gender and body types) will be performed. After randomly assigning groups, participants will be exposed to stimuli and then given scales to measure self-concept and body-image. Data will be collected by December, from there we will run ANOVAs, correlations, and t-tests to determine the extent of effects caused by exposure.
Results: Pending
Conclusions: This study will shed light on the effects of image-centric social media and muscular or exaggerated hourglass figures. If significant interactions are found, the study would give insight to consumers on latent effects of media consumption in today's society.

Adrienne Skelton

Jefferson City, MO

Junior
Special Education

Sp20-132

Faculty Mentor: Dr. Chad Rose, Special Education

Improving Social Skills and Communication to Improve Academic Self Efficacy among Youth

Adrienne Skelton, Grace Kempen, and Chad Rose

Social and communication skills are a critical component of student success. Students who have social and communication skill deficits often report less competence with academic tasks and lower levels of academic self-efficacy. Therefore, it is important to implement programming that will address these deficits to improve academic achievement and social functioning. The purpose of this project was to implement a 10-week social and emotional learning skill intervention for youth in grades k-5 that have been identified with social and communication skill deficits to improve the students' self-efficacy in academics and teachers' perceptions of academic competence. Overall, this project was designed to support the individual needs of students who are struggling with social and communication skill deficits. These deficits are related to detrimental short- and long-term outcomes including programs with academic achievement, self-efficacy and confidence. In this project, approximately 500 youth in grades K-12, who were identified by their teachers or school officials as needing additional supports, received 10 weeks of social and communication skill instruction via a web-based intervention that involved webisodes related to social interactions, social and communication skill acquisition, and recognizing, reporting and responding to bullying incidents. Results of this project demonstrated the utility of implementing a social and emotional learning program to improve social and communication skill acquisition. Based on a repeated measure multivariate analysis of variance (MANOVA), youth reported increased levels of academic self-competence, while their teachers reported increased academic competence. Overall, this project demonstrated that implementing a 10-week social and emotional learning curriculum could improve social and communication skill acquisition for a targeted subset youth, while improving academic self-efficacy and confidence. Based on the results of this project, it is recommended that schools consider implementing a targeted social and emotional learning curriculum to improve student outcomes and well-being.

Paige Smith

St. Peters, MO

Senior
Public Health

Sp20-8

Faculty Mentor: Dr. Enid Schatz, Public Health

HIV/NCD Comorbidity in Sub-Saharan Africa: The Need for a Synergistic Health Care Model

Paige Smith, Lucia Knight, and Enid Schatz

Our aim is to assess missed opportunities of HIV/NCD (non-communicable disease) testing among older South Africans. A pilot study, using the Testing & Risk History Calendar, with 30 participants (aged 50-plus, 7 HIV-positive/23 HIV-negative) was conducted in two sites in South Africa. We calculate the prevalence of self-reported comorbidities, and the frequency of HIV and/or NCD screening. Overall, over half of the sample had high blood pressure, and another 20% had diabetes; about 15% reported both. Despite extensive NCD care engagement, the majority of HIV testing was for those who reported being HIV-positive. HIV tests were generally provider initiated due to the patient showing HIV symptoms, rather than part of routine care. Routine testing opportunities for early HIV detection are not occurring among older adults. A synergistic, preventative health care model that encourages routine testing for HIV and NCDs concurrently would benefit the health of older South Africans.

Kiwon Song

Seoul, South Korea

Senior
Psychology

Sp20-79

Faculty Mentor: Dr. Evelyn Cho, Psychological Sciences; Dr. Kristin Hawley, Psychological Sciences

Predictors of Informant Discrepancies on Observer, Therapist, Youth, and Caregiver Ratings of Treatment Adherence

Kiwon Song, Evelyn Cho, and Kristin Hawley

Evidence-based practices (EBPs) are not consistently used in usual care (UC), and practical treatment adherence monitoring tools may improve EBP implementation in UC. While informant-rated adherence measures may be a feasible approach to measuring adherence in UC, youths, caregivers, and therapists tend to report higher adherence than do trained coders. To better understand the promise of informant-rated adherence measures, we need research on the factors that impact informant discrepancies.

We examined agreement between youth, caregiver, therapist, and observer ratings of therapist adherence to cognitive-behavioral therapy (CBT) and examined predictors of informant discrepancies. We hypothesized that (1) observer-therapist correspondence would be moderate; (2) correspondence between all other informant pairs would be low; and that older youth age, youth previous therapy experience, more caregiver in-session involvement, and therapist CBT training would predict lower discrepancies.

Participants were 48 youths and caregivers who received CBT from 28 therapists. Three observers coded all treatment sessions. After every session, all informants rated how much therapists did 17 CBT components on the Cognitive-Behavioral Therapy Adherence Measure (CBTAM; Hawley, 2013), a measure of the core components of EBPs for the youth anxiety, depression, and disruptive behavior. Observers also rated the amount of caregiver in-session involvement using the Therapy Process Observational Coding System (Southam-Gerow & Weisz, 2010). We calculated standardized difference scores (De Los Reyes & Kazdin, 2004) to measure informant discrepancies on CBTAM ratings.

Agreement was as follows: observer-therapist *M* ICC=.51, therapist-youth *M* ICC=.34, observer-caregiver *M* ICC=.27, therapist-youth *M* ICC=.27, observer-youth *M* ICC=.26, and caregiver-youth *M* ICC=.22. Older youth age predicted lower therapist-youth discrepancies (β=-.21, p=.004). More caregiver involvement in therapy sessions predicted higher caregiver-youth discrepancies (β=.29, p=.001). Findings show the promise of therapist-report as a practical method to measuring adherence in UC. Improving youths' and caregivers' understanding of treatment content and rating adherence may improve agreement.

Paige Spencer

Overland Park, KS

Freshman

Biological Sciences; Music

Sp20-33

Faculty Mentor: Dr. Paula McSteen, Biological Sciences; Norman Best, Biological Sciences

Funding Source: Freshmen in Plant Sciences (FRIPS)

Mapping loci responsible for auxin mediated development of the primary root in maize

Paige Spencer, Stephanie Sage, Norman B. Best, and Paula McSteen

Abstract withheld due to proprietary permissions.

Sidney Steele

Nixa, MO

Senior

Political Science; Journalism (Convergence)

Sp20-106

Faculty Mentor: Dr. William T. Horner, Political Science

Laughing through the News: Comedy News and Political Decision Making

Sidney R. Steele and William T. Horner

Over the past 20 years, comedy news programs such as Saturday Night Live and The Daily Show have increasingly become one of the primary sources of political information for young people. This paper seeks to discuss how comedy news effects its viewers political decision making and information retention. This paper looks at partisan biases associated with the hosts, viewers and content of the shows. It evaluates who watches comedy news and how these viewers differ from similar demographics that do not watch the same programs.

This paper evaluates frames in communications and partisan bias in comedy news and compares them to conventional television news programs. Using data from the American National Election Studies and the National Annenberg Election Survey, this paper looks at voting habits and levels of political engagement among participants who watched comedy news programs. An experiment was conducted as a part of this research in which participants viewed either a comedy news or conventional television news clip on a selection of topics and answered questions about their opinions on the topics they viewed. Participants answered follow up questions after a period of one week to assess their information retention on the topics they viewed.

The findings of this research show that there is a positive relationship between viewership of comedy news and voting rates. Viewers of comedy news are more likely to have opinions that agree with those of the show's host and remember details from the comedy news program. Comedy News is an effective way to communicate political news information, and shows just as much news content as conventional television news programs.

Harrison Stoudt

Imperial, MO

Sophomore

Natural Resources Science and Management

Sp20-146

Faculty Mentors: Summer Higdon, School of Natural Resources; Dr. Ron Revord, School of Natural Resources

White-tailed Deer and Coyote Activity in an Agroforestry Landscape

Harrison D. Stoudt, Summer D. Higdon, Matthew E. Gompper, and Ronald Revord

Agroforestry, the integration of trees into livestock and crop farming systems, provides an opportunity for food production and functional ecological processes to co-exist. Such systems may alter wildlife behavior and interactions, but research on wildlife in the agroforestry setting is limited. In fall 2019, we conducted a camera trap survey at the Horticulture and Agroforestry Research Center (HARC) to evaluate white-tailed deer (Odocoileus virginianus) and coyote (Canis latrans) activity patterns in the context of an agroforestry farming system. We analyzed deer and coyote activity within five natural (edge, open, wooded) or farmed (orchard, pasture) cover types present on the farm using the R packages 'activity' and 'overlap' to quantify and compare activity patterns. We found both coyotes and deer were active at night, but deer also had activity peaks in the morning and evening. Although temporal overlap between deer and coyotes was high (0.74; 95%CI=0.64-0.79), we observed some spatial segregation among available cover types. Both species were recorded in every cover type at least once, but coyotes spent most of their time in orchard and wooded areas, while deer used open and orchard cover types most frequently. Coyotes may have shifted their activity to nocturnal hours and limited their diurnal activity to primarily wooded areas due to the regular presence of human activities at HARC. There was a significant difference between deer and coyote use of wooded ($p=0.02$) and edge ($p<0.001$), but not orchard ($p=0.98$) areas. Orchards may represent a high-resource area for deer and coyotes (i.e., tree nuts and prey species available), which could explain the shared use of orchard areas we observed. Surveys spanning multiple years and seasons, and additional analyses are required to gain a more complete understanding of these relationships in the agroforestry setting.

Jack Sudekum
St. Louis, MO

Junior
Biochemistry

Sp20-149

Faculty Mentor: Dr. Aaro Stoker, Orthopaedic Surgery

Funding Source: Thompson Laboratory for Regenerative Orthopaedics

Comparison of Methods for Whole Elbow Osteochondral Allograft Preservation

Jack Sudekum, Gregory J. Della Rocca, James L. Cook, and Aaron M. Stoker

Introduction

Articular cartilage disorders of the elbow are common. As such, OCA transplantation merits consideration as an option for surgical treatment of cartilage disorders of the elbow. However, for many of the common elbow disorders requiring surgery, complete resurfacing of the joint using bipolar grafts may be necessary to fully address the articular pathology and restore functionally integrity to the joint. Therefore, this study was designed to determine if chondrocyte viability could be maintained at desired levels in elbow OCAs that were stored *en bloc*. Maintaining the minimum essential chondrocyte viability in whole elbow OCAs using an AATB and FDA compliant preservation protocol for at least 28 days is a critical step in optimizing methods for functional joint restoration in this large and growing population of patients. It was hypothesized that ankle OCAs stored using two novel preservation protocols would maintain minimum essential chondrocyte viability (>70% of Day 0 viable chondrocyte density) for 28 days of storage in a preclinical canine model.

Methods

All procedures were performed with ACUC approval. Elbow joints were harvested from canines euthanatized for reasons unrelated to this research and were randomly assigned to either the day 0 control (n=5), storage protocol A at 4°C (n=5), or storage protocol B at 25°C (n=5). Media was changed every 7 days, and on day 28 the cartilage tissue was then assessed for cell viability. Viable chondrocyte density (VCD) was determined by counting the number of viable cells per image and dividing it by the area of the cartilage tissue. Additionally, the %Day-0 VCD was determined for each OCA using the mean Day-0 VCD as the denominator. Significant differences among groups were determined using One-way ANOVA with significance set at $p<0.05$.

Results

Assays and data analysis for this study will be presented on the poster.

Wenting Sun
Qiqihar, China

Senior
Psychology

Sp20-151

Faculty Mentor: Dr. Amanda Rose, Psychological Sciences

Vagal Tone and Perceived Support within Adolescent Friendships: Considering the Role of Interaction Type and GenderQuality

Wenting Sun, Taoru Huang, Sarah Borowski, and Amanda Rose

Vagal tone (i.e., parasympathetic regulation of cardiac activity via the vagus nerve) is an important factor for emotional self-regulation (Beauchaine, 2015) and functioning in close relationships (Porges, 2019). It is frequently measured using respiratory sinus arrhythmia (RSA) which indexes high-frequency heart rate variability over the respiration cycle. RSA has been linked with youths' peer group functioning, including positive coping with victimization (Erath & Tu, 2014) and boy's prosocial behavior (Eisenberg et al., 1995, 1996). However, RSA has not been considered in relation to adolescent friendships (Murry-Close, 2012), which are central sources of emotional support during adolescence (Furman & Rose, 2015). The current study examined relations between adolescents' resting RSA activity and their perceived support during friendship interactions. We hypothesize that higher levels of RSA will be associated with higher levels of perceived support. We also consider whether the association between resting RSA activity and perceived support depends on the context in which support is given (i.e., plan a party/positive context, talking about a problem/negative context), and gender. To address hypotheses, 146 participants who were 8th, 9th, and 10th grade came in the lab with a same-gender friend. Three disposable electrodes were applied to participants' torsos to monitor electrocardiogram (ECG) data, and a monitor respiration belt was applied around their diaphragms. Resting RSA activity was measured while adolescents sat quietly for 3 minutes in separate rooms. Friends participated in two interaction tasks: (1) talk about a personal problem for 16 minutes and (2) planning a party for 7 minutes. After each task, adolescents responded 10 items assessing perceived friendship support (e.g., "My friend accepts me no matter what I do") on a 5-point scale ranging from 1 (*not at all true*) to 5 (*really true*).

Mathew Swan

Hartsburg, MO

Senior

Political Science; Ancient Mediterranean Studies

Sp20-113

Faculty Mentor: Dr. Sheena Greitens, Political Science

Comparative analysis of South Korean and Philippine foreign policy in light of regime changes

Mathew Swan and Sheena Chestnut Greitens

Within the current literature, the implications of regime type on a nation's foreign policy are largely examined in terms of a country's present circumstances, avoiding considerations of the role that temporal aspects may play in influencing international behaviors. It is the purpose of this paper to examine the effects of past regime transitions on a nation's foreign policy. By doing so, a greater understanding of why various regimes behave in the ways that they do can be developed. In order to address this, a comparative case study analysis of South Korea and the Philippines was conducted. For South Korea, the regime change investigated was the 1987 democratic election of Roh Tae-woo, and the foreign policies of Roh and Park Chung-hee were studied. For the Philippines, the 1986 election of Corazón Aquino was examined, and the policies of Aquino and Ferdinand Marcos were considered. Foreign policy changes displayed during these two regime transitions are being studied for indications that the changes in government type resulted in varying policies. Analysis is ongoing, and the results and implications will be presented at the University of Missouri's Undergraduate Research and Creative Achievements Forum.

Makenzie Thoenen

Loose Creek, MO

Junior

Communication Science and Disorders

Sp20-48

Faculty Mentor: Dr. Mili Kuruvilla-Dugdale, Speech, Language and Hearing Sciences

Articulatory Coupling in Parkinson's Disease: Does Word Complexity Matter?

Makenzie Thoenen, Madalyn Micheal, Dylan Thompson, Alyssa Buie, Tara Fogarty, Emma Travis, and Mili Kuruvilla-Dugdale

Typical young adults exhibit relatively independent movement of non-adjacent tongue regions such as the tip and dorsum during speech production. Such independence, indexed by a strong negative correlation of non-adjacent tongue region movements, allows for adequate phonetic distinctiveness during speech production. Therefore, the degree of negative intralingual coupling is an important metric of speech motor performance that is particularly relevant to our understanding of the articulatory mechanisms that underlie reduced speech precision and intelligibility loss in dysarthria. The aim of the current study was to examine if intralingual coupling is altered in Parkinson's disease (PD) and whether intralingual coupling varies with phonetic complexity demands in PD. 3D electromagnetic articulography was used to track tongue tip (TT) and tongue dorsum (TD) movements of 15 people with PD and 15 healthy controls, during 10 target words representing either low or high phonetic complexity levels. Phonetic complexity was calculated using the Kent (1992) framework. Intralingual coupling was estimated from a covariance index comprising the average pairwise correlation and standard deviations of TT and TD movements for each word. Preliminary results from 16 participants show highly coupled intralingual movements for high complexity words in controls. By contrast, in PD, regardless of phonetic complexity, weak intralingual coupling was observed, potentially driven by restricted movement of one or both tongue regions. The study findings will help advance our understanding of the articulatory mechanisms contributing to speech imprecision in PD and will allow us to meet translational needs aimed at developing more sensitive speech assessments for dysarthria.

Dylan Thompson
St. Robert, MO

Senior
Communication Science and Disorders

Sp20-50

Faculty Mentor: Dr. Mili Kuruvilla-Dugdale, Speech, Language and Hearing Sciences

Articulatory Coupling in Parkinson's Disease: Does Word Complexity Matter?

Dylan Thompson, Makenzie Thoenen, Madalyn Michael, Alyssa Buie, Tara Fogarty, Emma Travis, and Mili Kuruvilla-Dugdale

Typical young adults exhibit relatively independent movement of non-adjacent tongue regions such as the tip and dorsum during speech production. Such independence, indexed by a strong negative correlation of non-adjacent tongue region movements, allows for adequate phonetic distinctiveness during speech production. Therefore, the degree of negative intralingual coupling is an important metric of speech motor performance that is particularly relevant to our understanding of the articulatory mechanisms that underlie reduced speech precision and intelligibility loss in dysarthria. The aim of the current study was to examine if intralingual coupling is altered in Parkinson's disease (PD) and whether intralingual coupling varies with phonetic complexity demands in PD. 3D electromagnetic articulography was used to track tongue tip (TT) and tongue dorsum (TD) movements of 15 people with PD and 15 healthy controls, during 10 target words representing either low or high phonetic complexity levels. Phonetic complexity was calculated using the Kent (1992) framework. Intralingual coupling was estimated from a covariance index comprising the average pairwise correlation and standard deviations of TT and TD movements for each word. Preliminary results from 16 participants show highly coupled intralingual movements for high complexity words in controls. By contrast, in PD, regardless of phonetic complexity, weak intralingual coupling was observed, potentially driven by restricted movement of one or both tongue regions. The study findings will help advance our understanding of the articulatory mechanisms contributing to speech imprecision in PD and will allow us to meet translational needs aimed at developing more sensitive speech assessments for dysarthria.

Teresa Toarmina

St. Louis, MO

Junior
Elementary Education

Sp20-95

Faculty Mentor: Dr. Sara Prewett, Educational, School & Counseling Psychology

Funding Source: DOE Education and Innovation Grant # U411C180114

Development of Prosocial and Active Learning (PAL) Classrooms Intervention

Teresa Toarmina and Sara L Prewett

The University of Missouri in addition to eMINTS National center is currently developing the *Prosocial and Active Learning* (*PAL*) professional development program. PAL Classrooms aims to provide teachers the skills to teach prosocial behaviors combined with problem-based learning through intensive professional development sessions. This approach embeds technology-rich curriculum with prosocial behavior development and relationship building. PAL classroom's main goal is to promote student self-control through modeling and research-based strategies that teach empathy, prosocial behaviors, and values.

The PAL program is just finalizing its first year of the development process with three schools (6 teachers and 114 students). The intervention includes 60 hours of professional development and instructive coaching sessions. The participating teachers learn teaching strategies, student-teacher relationships, effective praise, and effective discipline techniques. Both qualitative and quantitative data were analyzed to determine implications for iterative development of PAL. Preliminary results are promising. Teachers are enthusiastic about the program, students are developing higher quality relationships with their teachers and each other, and teachers are shifting the way they praise and discipline students.

Avery Torbett
Fernandina Beach, FL

Junior
Special Education

Sp20-94

Faculty Mentor: Dr. Mike Metz, Learning, Teaching & Curriculum

Rural-Urban Intersections in Teacher Language Ideologies

Avery Torbett and Mike Metz

Linguistically informed approaches to language teaching are gaining increasing traction in urban schools with large numbers of language minority students. However, to date, there has been little research that explores these approaches in suburban or rural school districts, particularly those with predominantly white, standardized English-speaking, student populations. This study looks across urban, suburban, and rural contexts in the state of Missouri to explore the intersections and distinctions in teachers' language ideologies. The findings help build a knowledge base to support English Educators in reframing the teaching of English language in schools in ways that align with contemporary understandings of language variation.

Marissa Turner
Columbia, MO

Senior
Psychology

Sp20-61

Faculty Mentor: Dr. Russell Ravert, Human Development & Family Science

Taking Risks in Sports: College student-Athlete Experiences and Attitudes

Marissa Kionna Turner, Wenting Sun, and Russell Douglas Ravert

This study of college athletes was designed to address these research questions:

- What attitudes do college student-athletes have regarding taking risks and chances, versus playing it safe, in competitions?
- Who or what do college student-athletes report as the strongest influences on their views toward taking risks as an athlete?

The sample was 101 Mizzou student-athletes, recruited in spring 2020. Participants completed a 26-item paper survey that asked about their views on taking chances and risks in sports. Approval for the study was obtained from Campus IRB and Mizzou Athletics.

Participants were asked about, a) an incident where they had to decide whether or not to take a risk, b) whether/when they thought playing it safe was a good thing, and c) influences on their beliefs about when to take a risk or play it safe as an athlete.

Steps of content analysis conducted were, a) review survey responses to familiarize themselves with the data, b) open coding of responses to identify potential themes, c) establishing a set of exclusive/exhaustive thematic categories and definitions, d) randomly selecting 20% of cases and coding each response into the appropriate category by a primary coder, e) coding of those cases by a second coder to test reliability, and refining of categories and repeating if needed to reach satisfactory agreement, f) final coding and counting of all cases, g) interpretation of results.

Among results, influences on risk attitudes were found to be coaches (cited by 69.3% of athletes), parents (35.6%), and teammates (21.8%), own experiences, (9.9%), other family members (5%), and friends (5%). Specific motivations included taking risks as an offensive or defensive strategy, to qualify for something, to avoid regrets, and for personal growth or teammate recognition.

Micah Turell

Fulton, MO

Junior

Natural Resources Sciences and Management

Sp20-58

Faculty Mentor: Dr. Manuel Leal, Biological Sciences

Funding Source: Life Sciences Undergraduate Research Opportunity Program (LSUROP)

Microclimate Influences Variation in the Upper Thermal Tolerance of a Complex Lifecycle Amphibian

Micah Turrell and Manuel Leal

Microclimatic conditions experienced by individuals within a population can vary dramatically, particularly in the thermal regime. Notably, the temperature experienced by developing embryos can result in individual differences in physiological traits due to acclimation. Complex lifecycle amphibians, such as pond-breeding Spotted Salamanders (*Ambystoma maculatum*), provide an opportunity to evaluate whether the temperature experienced by developing embryos affects the upper thermal limit of those individuals in later life stages. We investigated the effect of aquatic microclimate on critical thermal maxima (CT_{max}) during multiple stages in the lifecycle of *A. maculatum*. Utilizing a replicated split-clutch experimental design, we raised *A. maculatum* in partially shaded and sunny treatments, which were located ~100 m apart. We measured the water temperature of each treatment and found that salamanders in the sun developed at a mean temperature of 13.9°C, while those in the partial shade developed at a mean temperature of 12.5°C. We also measured CT_{max} of larval and metamorphic salamanders from both treatments and found that individuals from the sun treatment had a significantly higher CT_{max} (larval $\bar{x}$ = 37.4°C and metamorphic $\bar{x}$ = 37.8°C) than individuals from the partial-shade treatment (larval $\bar{x}$ = 36.2°C and metamorphic $\bar{x}$ = 36.9°C). Our results suggest *A. maculatum* may display intrapopulation variation in thermal tolerance due to acclimation to distinct microclimatic conditions. However, our results are insufficient to determine if the variation between treatments is due to seasonal or developmental acclimation. More generally, our findings strongly suggest that the natural microclimate variation commonly encountered by pond breeding salamanders can impact the physiological traits of individuals, potentially contributing to differences in fitness.

Zoe Tyler

St. Louis, MO

Junior

Theatre; Educational Studies

Sp20-89

Faculty Mentor: Dr. Stephen Whitney, Educational, School & Counseling Psychology

Change in Socioeconomic Status and its Influence on Academic Achievement

Zoe Tyler, Emma Weil, and Stephen D. Whitney

Socio-economic status (SES) change is examined on the longitudinal growth of reading achievement from first to fifth grade. Data are from a nationally representative, longitudinal data set taken from the United States of America. Several predictors were included in the analysis while following an ecological framework: approaches to learning, self-control, the parental education expectations, the parental involvement in school, the parental support of school staff, negative school environment, and neighborhood problems. In this research, we accounted for various expected factors that turned out to be not associated with change in SES and reading growth. However groups were different at baseline.

Mikayla Ursery

Poplar Bluff, MO

Senior
Psychology

Sp20-75

Faculty Mentor: Dr. Shawn Christ, Psychological Sciences

Basal Ganglia Morphometry in Individuals with Early-Treated Phenylketonuria (PKU)

Mikayla Ursery and Shawn E. Christ

Main Purpose: While the effects of early-treated phenylketonuria (ETPKU) on white matter have been heavily researched, the impact of this metabolic disorder on gray matter structures of the brain, such as the basal ganglia, remains largely unaddressed. A past study by Bodner (2012) found significantly larger putamen volumes for a sample of individuals with ETPKU as compared to a non-PKU group. They also found a significant correlation between the degree of enlargement in the putamen, blood phenylalanine levels, and full scale IQ in the ETPKU group. The study aims to extend this research and examine potential volumetric differences of the basal ganglia (i.e., caudate nucleus, putamen, and nucleus accumbens) in a much larger sample of individuals with and without PKU.

Procedure: The study used a 3T Siemens Trio MRI scanner with a standard 8-channel head coil to obtain high-resolution (1 mm3) T-1 weighted structural images of the brain. The structural MRI data for each participant was rotated into AC–PC coordinates, and the skull and dural tissue were removed from the images using a semi-automated object extraction procedure in Free Surfer. Whole brain volume (WBV) for each participant was calculated, and the gray matter structures of interest (i.e., caudate nucleus, putamen, and nucleus accumbens) were manually segmented in a standardized fashion to obtain precise volumetric measurements.

Results and Conclusions: Data for the study was processed and analyzed using a hierarchical linear regression model. This method of analysis would allow for evaluation of potential group-related differences in basal ganglia volume while controlling for individual differences in WBV and age. For the regression model, age and whole brain volume were entered in the first step followed by group (PKU and non-PKU) in the second step. Interaction terms (e.g., age x group) were included in the third and final step of the model.

Shaina Vanglider

Columbia, MO

Junior

Secondary Education (Biology); Plant Sciences

Sp20-107

Faculty Mentor: Dr. Marjorie Dorime-Williams, Educational Leadership & Policy Analysis; Dr. Michael Williams, Educational Leadership & Policy Analysis

Participatory Action Research as a Tool for Student Affairs and Academic Affairs Collaboration

Shaina Vangilder, Ekaete Udoh, Soobin Choi, Oscar Medina, Marjorie Dorime-Williams, and Michael S. Williams

Abstract withheld due to proprietary permissions.

Yahor Vazmitsel
Columbia, MO

Freshman
Chemical Engineering

Sp20-150

Faculty Mentor: Dr. Kuanysh Kabytaev, Pathology and Anatomical Sciences

Glycation Profile for Human Serum Albumin

Yahor Vazmitsel, Frederick Boland, Shawn Connolly, and Kuanysh Kabytaev

The amino groups of lysine of plasma proteins are susceptible to a non-enzymatic reaction with glucose under physiological conditions. This glycation process ultimately can lead to diabetes complications, oxidative stress and aging process. Due to fact that diabetic patients have high glucose concentration, the amount of glycated proteins can be used as a marker of disease progression. Glycation degree for different lysine residues vary and depend from protein location, lysine reactivity and glucose concentration. We have studied glycation profile of most abundant plasma protein albumin. The degree of glycation for each site was defined as the percentage of glycated to sum of glycated + non-glycated lysines. To get most comprehensive profile two MS instruments were used: timsTOF-Pro and Q-trap. Ion mobility was used as an additional separation dimension; PASEF MS/MS scans for fragmentations in timsTOF. Q-trap instrument was used in two different modes: CID/HCD and neutral-loss. In-vitro glycated HSA and plasma from diabetic and non-diabetic patients were reduced/alkylated and digested by Glu-C. The peptide mixture were separated in a nano-flow C18 system or HxSIL C18 in a MeCN/H2O linear gradient depend from MS platform. Raw data was analyzed using PEAKS X or Proteome Discoverer. All discovered glycation peptides were manually validated. In summary, we created glycation profile for serum albumin that can be used in the future as hyperglycemia biomarker.

Meg Vedra

Fulton, MO

Freshman
Biochemistry

Sp20-131

Faculty Mentor: Dr. Antje Heese, Biochemistry

Funding Source: Freshmen in Plant Sciences (FRIPS)

Investigating roles of Clathrin-coated vesicle components in cell expansion in Arabidopsis thaliana

Meg Vedra, Tessa Jennings, Nga Nguyen, and Antje Heese

Abstract withheld due to proprietary permissions.

Conner Verhulst

Kansas City, MO

Senior
Biological Sciences

Sp20-37

Faculty Mentor: Dr. Casey Holliday, Pathology and Anatomical Sciences

Funding Source: Life Sciences Undergraduate Research Opportunity Program (LSUROP); Grants to Casey Holliday: NSF IOS 1457319; NSF EAR 1631684

3D Muscle Architecture of Avian Jaw Muscles and their Significance for cranial functional morphology evolution

Conner Verhulst, Alec Wilken, Kevin Middleton, and Casey Holliday

Birds evolved a diversity of head shapes, feeding behaviors and jaw muscles which drive the feeding apparatus. Capturing the anatomical diversity of these muscles remains challenging and we know little about how jaw muscles develop, function and evolve among lineages. Here we use contrast imaging and 3D muscle fiber tracking to explore the morphological and functional significance of the jaw muscles of birds to highlight the potential of these approaches. First, we show differences in functional morphology of jaw muscles between a hatchling and adult Mallard duck (Anas platyrhynchos). Ducks show a marked change in adductor chamber shape during ontogeny including an elongated postorbital process, quadrate orbital process and retroarticular process which likely track with changes in muscle function and cranial kinesis. Indeed, we found m. depressor mandibulae in baby and adult ducks shifts from a rostrocadual orientation to a more dorsoventral orientation that offers additional mechanical advantage to jaw opening and propalinal mandible movement as well as concomitant changes in the 3D resultant and pennation of other jaw muscle bellies. Second, we show differences between a long- and short-faced, dabbling birds (mallard, green-wing teal), long faced orthally-biting bird (belted kingfisher) and a short-faced, hard-biting bird, the grey parrot (Psittacus erithacus). We expected position, architecture and biomechanics of homologous muscles to differ substantially between these avian species given their different behaviors and overall cranial morphology. Although some muscles showed marked differences in resultant and pennation, others were remarkably similar in morphology suggesting a mosaic of changes happening during avian evolution. Together, these 3D high fidelity anatomical data on jaw muscle functional morphology in birds will not only better illuminate ecomorphological evolution but also illustrate how clades of birds and vertebrates adapt their muscle architecture to meet functional demands.

Joseph Wansing
Marshall, MO

Senior
Psychology

Sp20-76

Faculty Mentor: Dr. Phillip Wood, Psychological Sciences

Internet Search Strategies, Concepts of Justification and Epistemic Beliefs

Joseph Wansing and Phillip Wood

How people reason about complex, real-world problems often involves assumptions about the nature of knowledge, how (or whether) opinions are justified and the role of expert opinion about such issues are often important considerations. For college students, assumptions about the nature of knowledge and learning about real-world problems plays a role in students' study behaviors or perceptions of the value of college coursework. More generally, these assumptions may also play a role in other behaviors, such as how individuals use search engines to locate information on the internet. This study examines the relationships between these three topics.

Specifically, this study examines use of an instrument, the Reasoning about Current Issues Test (RCI) a measure designed to assess how individuals justify their opinions about four real-world problems. Items are designed to reflect levels of sophistication as summarized by the Reflective Judgment model (King & Kitchener, 1994). A second instrument consists of a selected items of the Epistemological Beliefs Inventory (EBI, Wood & Kardash, 2002) and assesses students' assumptions about whether learning is all-or-none and the assumptions about truth and uncertainty in college coursework. A third instrument, the Internet Search Strategies Assessment (ISSA) asks participants how they use internet search engines to gain information particularly when the information available is contradictory.

Procedure: Participants were 300 college students who received course credit in an introductory psychology course at a large Midwestern university. The RCI solicited individuals' opinions about how they justified their opinions on the topics of: immigration policy, safety of genetically modified foods, possible biological basis of homosexuality and whether alcoholism has genetic determinants. Participants also completed a short form of the EBI which assessed assumptions about the nature of knowledge and student success.

Olivia Watt

Rolla, MO

Freshman
Journalism; English

Sp20-177

Faculty Mentors: Dr. Michael Marlo, English; Dr. Rebecca Grollemund, LInguistics

Funding Source: ASH Scholars

Documenting Luyia Together: Marachi Talking Dictionary

Olivia Watt, Angela Schlaker,Rebecca Grollemund, and Michael R. Marlo

This presentation describes research to develop the first talking dictionary of the Marachi language as part of the ASH Scholars research team *Documenting Luyia Together* during the 2019-2020 academic year. Our joint effort contributes to the documentation of Marachi, a member of the Luyia language cluster in western Kenya. The 2019 Kenyan census identified about 65,000 members of the Marachi ethnic community, although it is unknown how many speakers of the language there are. Marachi is an under documented language, with very few prior publications or research on the language, and no published dictionary to date. Our research builds on an effort by Dr. Michael Marlo in 2012 to collect Marachi dictionary materials from a speaker of the language. Prior research generated a list of about 4000 words with corresponding translations and around 4500 sound files with pronunciations of those words. In Fall 2019, we added an identification number and spelling of the word in Marachi to the file names of the sound files in order to link the sound files with the dictionary entries to create the first talking dictionary of the language. We also helped edit the audio archive and the dictionary by checking all of the sound files to ensure that they represented words in the dictionary. In some cases, we found sound files with no pronunciations inside, so we removed those files from the archive. In other cases, we found words to add to the dictionary and translations to update. Our work helps to ensure that the language is preserved and documented and supports future research efforts on the language and the development of pedagogical materials for the teaching of the language in schools.

Garren Wegener
Warrensburg, MO

Senior
Psychology; Business Administration

Sp20-114

Faculty Mentor: Dr. Laura King, Psychological Sciences

Moderating Influence of Neuroticism on the Relationship Between Authenticity and Well-being

Garren Wegener, Jake Womick, and Laura King

A. Purpose. Existing research consistently demonstrates a positive relationship between authenticity and well-being. We predicted that authenticity and well-being would be less strongly related among people high on neuroticism. Indirect support for this idea comes from previous research showing that the association between authenticity and well-being is weaker among people high on Dark Tetrad personality traits.
B. Procedure. Study 1 (N=844) was a cross-sectional correlational study in which participants completed established measures of personality traits, authenticity, and well-being. We also measured of belongingness and optimism as candidate mediators.
C. Results. Study 1 results showed that, as expected, authenticity was positively related to well-being, r=.57, p<.001, and that neuroticism was negatively related to these, r's=-.61, and -.70, respectively, both p's<.001. Supporting our prediction, in a hierarchical regression model, neuroticism (main effect β=-.57, p<.001) significantly moderated the relationship between authenticity (main effectβ=.23, p<.001; first step ΔR2 =.53, p<.001) and well-being, interaction

β=-.07, p=.006 (second step ΔR2 =.004, p =.006). Decomposing this interaction showed that, among those low on neuroticism, authenticity was more strongly related to well-being, r(141)=.43, p<.001 than among those high on neuroticism, authenticity was unrelated to well-being, r(120)=-.11, p=.22, z=5.56, p<.001. These results suggest being "who one really is" may be a less viable pathway to well-being among those who are highly neurotic. Follow-up analyses will probe whether this pattern is more relevant to certain facets of neuroticism (anxiety, hostility, depression, self-consciousness, impulsiveness, or vulnerability), or particular components of well-being (global meaning in life, significance, purpose, coherence, life satisfaction, or self-esteem) and whether belongingness or optimism show evidence of moderated mediation.

Two follow-up studies are currently being conducted.

D. Conclusions. Authenticity is clearly important to well-being, however, the present research indicates that being true to oneself is less strongly related to well-being for those who are highly neurotic.

Laura Westbrook
Columbia, MO

Junior
Early Childhood Education

Sp20-19

Faculty Mentor: Dr. Sarah Buchanan, School of Information Science & Learning Technologies

Diversifying the Repertoire with ArCla (Archives of Classical Scholars)

Laura E. Westbrook and Sarah A. Buchanan

In Classical Studies, there is a plethora of unfinished works found within papers collections. It is not uncommon for scholars to record possible research projects or interpretations in their correspondence, notebooks, and manuscripts. However, because such collections are frequently found within special collections - located all over the world - the details tend to not be included in current databases. Thus, the scholars' work continues to lie incomplete. Additionally, Classical Studies has a problem of representation. Women and refugee scholars have contributed remarkably to the field, and yet their work is not taught in the standard canon. In order to fix both of these problems, The Archives of Classical Scholarship (ArCla) was created. Our new database combines multiple source materials, compiled through conversation with key collaborators, including colleagues in the Forum for Classics, Libraries, and Scholarly Communication and within the Five College Archive and Manuscript Collection. The sources provide the names of many lesser known scholars, of whom we spotlight women and refugee scholars. Then, through the use of WorldCat, ArchiveGrid, contact with individual archivists, and exploration of specific university collections, the locations of their paper collections were found and recorded so that future generations can complete the unfinished works. ArCla currently has 4533 records, 2239 of which were added since September, 2019.

Chrisee Wheeler

Paris, MO

Senior

Plant Sciences (Breeding, Biology and Biotechnology)

Sp20-153

Faculty Mentor: Dr. Harley Naumann, Plant Sciences

Funding Source: USDA NIFA

Effectiveness of Lespedeza Species as a Bioactive Forage in Ruminant Production Systems

Chrisee S. Wheeler and Harley D. Naumann

Using *Lespedeza cuneata* (sericea lespedeza) as a tannin-producing bioactive forage for livestock has been increasing in the United States. There are many other *Lespedeza* species that have not been adequately evaluated and compared to *Lespedeza cuneata*. Our objective was to analyze other *Lespedeza* species for condensed tannin production and bioactivity levels in comparison to *Lespedeza cuneata* to identify effective alternatives for binding protein and potentially increasing rumen undegradable protein.We evaluated 12 *Lespedeza* species from the germplasm collection at the USDA Plant Genetic Resources Conservation Unit in Griffin, GA. Plants were reared in a greenhouse and then transplanted to field plots at Fort Valley State University in Fort Valley, GA. Following establishment, plants were harvested, freeze dried, ground, and analyzed for the condensed tannin concentration and bioactivity. The analyses consisted of protein precipitable phenolics (PPP), total phenolics (TP), and protein bound (PB) to PPP. *Lespedeza virginica* ($P<0.0001$), followed by *L. divaricata*, produced the most PPP, wheras L. bicolor and L. tomentosa produced the least. *Lespedeza. virginica* and *L. divaricata* also had the greatest TP ($P<0.0001$) concentrations, whereas L. bicolor and L. intermixta had the least. *Lespedeza virginica, L. divaricata*, and *L. virgata* bound the most protein ($P<0.04$), wheras *L. bicolor* and *L. tomentosa* demonstrated the least ability to bind protein. Effectiveness of binding protein by the PPP was expressed as a ratio of PB:PPP. The PB:PPP ratio is an indicator of bioactive potency based on how effectively the protein was bound by PPP from each species. We concluded *Lespedeza cuneata* was the least potent and bioactive of the species evaluated and *L. virgata* was the most potent and bioactive species. Our results suggest there are more potent Lespedeza species, compared to *L. cuneata*, that may be used as a bioactive forage for increasing rumen undegradable protein.

Molly White
Washington, MO

Senior
Psychology

Sp20-14

Faculty Mentor: Dr. Amanda Rose, Psychological Sciences

Gender Role Orientation and Communication Style in Adolescence as Predictors of Romantic Relationship Existence and Satisfaction in Adulthood

Molly White and Amanda Rose

Major Purpose: This study explored potential relationships between the following variables: gender role orientation (masculinity v. femininity), communication style, gender of siblings, romantic relationship existence, romantic relationship satisfaction, and gender of romantic partner. This is important because learning how to communicate from an early age with either gender (ease of which may be influenced by one's own gender role orientation) may lead to higher levels of comfort and competency in communicating with them, and therefore higher satisfaction with a romantic relationship with someone of that gender as an adult.

Procedure: From 2007-2009, 7th and 10th grade students from a university town were selected for a study during which they and a friend completed a series of tasks together. In 2019/2020, these participants were sent a follow-up survey recording whether or not participants are in romantic relationships, satisfaction in those romantic relationships, gender of romantic partner, and number and gender of participants' siblings.

Expected Results: Statistical analyses are underway and will be completed as soon as the second wave of survey results are fully or mostly collected. This follow-up survey is currently being distributed to the original 628 participants. 265 have responded to date. Results are expected to indicate that individuals with opposite-sex siblings have higher relationship satisfaction with opposite-sex partners as adults than those with same-sex siblings or no siblings. Results are also expected to indicate that individuals with polarized gender role orientations and communication styles will have lower relationship satisfaction than those with more androgynous orientations and communication styles in relationships with partners of the opposite sex.

Conclusions and Implications: If there is a significant difference between romantic relationships and satisfaction between groups based on youth attributes, we will be able to determine that these youth attributes are associated with future romantic relationship attributes.

Samantha White

Gower, MO

Junior
Elementary Education

Sp20-100

Faculty Mentor: Dr. Stephanie Woods, Educational, School & Counseling Psychology

A grounded theory study of rural/nonrural differences of belongingness at a flagship university

Samantha White and Stephanie Woods

This qualitative study examines how rural preservice teachers studying at a flagship university develop a sense of belonging. Guided by Bronfenbrenner's Bioecological Systems Model (1977; Bronfenbrenner & Morris, 2006), we evaluated background influences on the development of a sense of belonging to narrow the rural/nonrural educational achievement gap. Our research was guided by the following questions: (1) How do rural students develop a sense of belonging at large universities? (2) How do strategies to make friends affect rural preservice teachers' sense of belongingness at a large university? (3) How do rural preservice teachers perceive that their ruralness affects their ability to develop a sense of belonging at a large university? We recruited nine preservice teachers, originating from rural (6) and urban (3) locales, for constant comparison. In order to build an understanding of what it is like to be a rural preservice teacher at a large university, we largely relied on each participant's view of the situation by using Data-Prompted Interviews (DPI)s to look for patterns to derive meaning of their experiences at a flagship university. A Constructivist Grounded Theory (CGT) approach was taken to develop a substantive theory (Strauss & Corbin 1998; Charmaz, 2014) to add to generalized models of student development. Constant comparison of the data revealed factors in each subsystem of the ecological model that may exert an important impact on rural students' belongingness. We generated a theory grounded in empirical data that had been systematically collected and analyzed (Strauss & Corbin 1998). Geographical background has an influence on a university students' development of belongingness. Expectations of school spirit and a lack of friend-making strategies negatively impacted rural students' needs' satisfaction. The findings can provide a valuable lens for administrators and faculty to better understand the challenges faced and supports needed by rural students.

Emma Wickland

St. Louis, MO

Senior
Public Health

Sp20-82

Faculty Mentor: Dr. Michelle Teti, Public Health

Evaluation of an Anti-HIV Stigma Program on the Knowledge and Attitudes of Emerging Health Professional Students

Emma Wickland and Michelle Teti

Abstract withheld due to proprietary permissions.

Jade Williams
Kansas City, MO

Sophomore
Psychology

Sp20-88

Faculty Mentor: Dr. Jordan Booker, Psychological Sciences

Personal Growth, Coping, and Well-Being in College Adults' Self-Defining Memories

Jade Williams and Jordan Booker

Background: Personal growth is a process involving self-transformation, often from a place of hardship or insufficiency to a place of redemption and strength (Pals, 2004). Researchers posit that a focus on positive aspects of life can promote psychological resources (Fredrickson, 2001). Personal growth can be measured through evaluations of shared autobiographical narratives, such as self-defining memories (Singer, 2004). In this study, we rated individual differences in displayed personal growth. We expected personal growth to be positively associated with coping and well-being. We also expected coping to partly explain ties between growth and well-being.

Method: Two-hundred eighty-eight college adults (M age = 18.43 years, SD = .88; 68.4% women) participated in a broader online study that occurred over two monthly sessions. Participants completed questionnaires including reports of coping strategies (Greenglass et al., 1999) at baseline and well-being (Su et al., 2014) at baseline and one-month follow-up. Participants also completed the Self-Defining Memory task (Singer & Blagov, 2004) at baseline, sharing a vivid memory that helps define how they understand themselves. These self-defining memories were rated for displays of personal growth and positive autobiographical reasoning (Mansfield et al., 2015).

Results: Displays of personal growth in self-defining memories were positive correlated with reports of coping strategies and well-being at baseline. Reports of coping strategies were positively correlated with reports of well-being at baseline and one-month follow-up. When modeled simultaneously, both growth and coping informed baseline well-being, but only coping informed one-month follow-up well-being. An indirect model was supported between baseline growth and later well-being, given reports of coping.

Discussion: Collectively, the results suggest that people who tend to find positive meaning in important life events also have more psychological resources for coping and well-being. Future work would benefit from longitudinal designs to consider the implications of personal growth for young adults.

Cate Willis

Little Rock, AR

Senior
Digital Storytelling

Sp20-47

Faculty Mentor: Katina Bitsicas, Digital Storytelling

Funding Source: ASH Scholars

Utilizing Virtual Reality and Video Installation to Explore Emotional Responses to Death and Dying

Cate Willis, Fatimah Krgo, Abby Blenk, Peter Helm, and Katina Bitsicas

Virtual Reality (VR) has been used in recent research on empathy creation for caregivers to experience what it is like during the final stages of their loved one's lives. California-based Embodied Labs, created a VR experience to help nurses and caregivers, empathize with patients at the end of their lives. The ASH Art of Death Digital Storytelling Research Team utilizes these tools to create an experience for viewers to move through the final stages of death and dying.

The In-Between is an interactive multimedia experience composed of two parts: A projected and VR video. The three scenes are a hospital bed, a burial, and waking to an afterlife, meant to represent the different stages of death. The team set out to create open-ended imagery that would leave room for interpretation from the viewer. Filmed from the perspective of the viewer, participants felt like they were in that environment and experiencing this process themselves.

Participants (N=36) viewed the projection as a group with the video filling the room, while the virtual reality video was experienced individually. The majority of participants (80.56%) felt the VR experience led them to reflect on mortality more than the projected video. The majority of participants (63.89%) also felt a greater than average sense of peace, whereas a minority (16.67%) of participants felt a greater than average sense of anxiety.

The data is a preliminary indication of what to study further: The experiential aspect of the study limited participants in the time allowed for data collection, so data is not a representative sample. Results indicate how the level of immersion in a death experience affects the thoughts and feelings of participants. Giving viewers the opportunity to conceptualize their own death could create an accepting mentality around dying and encourage open conversation.

Audrey Wind

Wildwood, MO

Junior
Biological Sciences

Sp20-161

Faculty Mentor: Dr. R. Michael Roberts, Biochemistry; Dr. Toshihiko Ezashi, Animal Sciences

Funding Source: Eunice Kennedy Shriver National Institute of Child Health and Human Development to R. Roberts

Estimating minimum BMP4 exposure time needed to prime human pluripotent stem cell differentiation to trophoblast

Audrey Wind, Yuchen Tian, Toshihiko Ezashi, and R. Michael Roberts

Diseases of pregnancy, such as preeclampsia, are believed to be caused by trophoblast dysfunction. However, ethical considerations prevent studies on the early stages of pregnancy when such diseases are initiated. Human embryonic stem cells (hESCs) can be coaxed to differentiate into placental trophoblast cells resembling those in early pregnancy by using a protocol (**BAP**) that involves the addition of **B**one Morphogenetic Protein 4 (BMP4), along with inhibitors of **A**ctivin/Nodal (A83-01) and FGF2 (**P**D173074) signaling. Our goal is to determine the minimum time hESCs must be exposed to BMP4 to provide complete differentiation to trophoblast, thereby providing insight into the process of trophoblast differentiation. To do this, the BAP medium was replaced with control medium, i.e. minus the BMP4, but still containing the inhibitors, at different times during a 7-day culture. The hESC (5 x 10^5 cells per d35 dish) were cultured under BAP conditions for either 6 h, 12 h, 24 h, or the seven days (control). After each set period, the medium was switched to contain A83 and PD173074 (AP), and no BMP4. Medium was collected on days 5, 6, and 7 to assess the production of pregnancy hormones (progesterone and human chorionic gonadotropin). We also collected photomicrographic images of the cells on these same days to compare with control data. Although the hormone assays are incomplete, the appearance of the cells exposed to BMP4 for 6 h was indistinguishable from all other cultures, including controls held under BAP conditions for 7 days. Colony expansion, an epithelioid-like morphology to the cells, and cell syncytialization were indistinguishable between treatments, suggesting that a BMP4 exposure of only 6 h is sufficient to prime the hESC for differentiation to trophoblast. Further strengthening of this hypothesis is expected from the hormone measurements conducted on the media samples and accurate assessment of colony areas.

Rebecca Winkler
Barnhart, MO

Senior
Biological Sciences

Sp20-170

Faculty Mentor: Dr. David Braun, Biological Sciences

Funding Source: McNair Scholars Program

Characterization of the novel maize carbohydrate partitioning defective mutant P135-21B

Rebecca L. Winkler, Rachel A. Mertz, Ruth Wagner, Karen Grote, Jeanette Peevers, Paul Chomet, Guri Johal, and David M. Braun

Sugar synthesized by photosynthesis needs to be efficiently exported from the leaves as sucrose to feed developing tissues. There are a class of maize mutants called *carbohydrate partitioning defective* (*cpd*) mutants which overaccumulate starch and soluble sugars in their leaves. High sugar levels in the leaves result in repression of photosynthetic gene expression, chlorosis, and anthocyanin accumulation in leaves. *P135-21B*, a novel maize mutant conditioned by a semi-dominant mutation, exhibits a progressive basipetal chlorosis and starch accumulation. Three main questions were addressed: whether both starch and soluble sugars hyperaccumulate, why there is carbohydrate hyperaccumulation in mutant leaves, and what is the causal gene. In order to locate and quantify the carbohydrate accumulation in source leaves, an Iodine/Potassium Iodide stain and a quantitative measurement of sugar and starch levels using High Pressure Anion Exchange Chromatography (HPAEC) were performed. Aniline Blue staining of adult leaves suggested that the mutant phenotype may be caused by a partial blockage of leaf veins by callose accumulation. To find the rough mapping interval, pools of mutants and wild type siblings were collected and DNA was extracted for a bulked segregant analysis. A region on chromosome 1S and an interval on chromosome 7S were found to be enriched in the mutants and deficient in the wild type. In order to find the causal genes, recombination breakpoints are being screened with polymorphic markers to narrow this interval down. Neither locus is shared with any previously characterized cpd mutant; thus, *P135-21B* is a novel gene.

Titus Wu

Arcadia, CA

Senior

Journalism (Print and Digital News),

Sp20-46

Faculty Mentor: Cristina Mislan, Journalism

Analyzing Early Election Coverage of 2020 U.S. Presidential Candidates

Titus Wu and Cristina Mislan

Abstract withheld due to proprietary permissions.

Sarah Wunder

Kansas City, MO

Senior
Psychology

Sp20-126

Faculty Mentor: Dr. Ken Sheldon, Psychological Sciences

Motivation for coming out as LGBTQ+

Sarah Wunder, Mike Corcoran, and Ken Sheldon

Purpose - This study will investigate the motivation and autonomy support of individuals who have or will come out as non-heterosexual (LGBQ+) or as transgender. The study will investigate LGBQ+ individuals as a separate group from transgender individuals to identify the differences in motivation and autonomy support between the two communities. This will contribute to foundational research into the LGBTQ+ community.

Procedure - Participants completed a survey measuring their motivation to come out as LGBQ+ or transgender, as well as their autonomy support in coming out, well-being, and needs satisfaction. The survey uses multiple choice and five point Likert scale questions. Motivation is measured through a general motivation scale and a comprehensive relative autonomy index adapted from Sheldon, Osin, Gordeeva, Suchkov, and Sychev (2017). Autonomy support is measured using an adapted version of the Learning Climate Questionnaire (Williams, 1993). Well-being and needs satisfaction are measured using standard scales. The samples include transgender participants, LGBQ+ participants, and participants who are both transgender and LGBQ+.

Results - The study has been IRB approved and is being released to LGBQ+ and transgender participants. Data collection is in process. The researchers hypothesize that LGBQ+ individuals are more intrinsically motivated to come out while transgender people have more identified or introjected motivations. They also hypothesize positive correlations, regardless of identity, between intrinsic motivation and well-being, and between intrinsic motivation and autonomy support, with autonomy support providing a larger impact for transgender individuals than LGBQ+ individuals.

Conclusions and Implications - As more people come out as LGBQT+, it is important to understand their motivations and the differences between communities in coming out. In understanding these motivational trends, individuals can provide better informed support for members of the LGBTQ+ community. This project will add to foundational research into the LGBTQ+ community, potentially prompting further research.

Lauren Wyatt

Kansas City, MO

Sophomore
Psychology

Sp20-144

Faculty Mentor: Dr. Jordan Booker, Psychological Sciences

Funding Source: McNair Scholars Program

Character and Resilience as Personality Factors

Lauren Wyatt and Jordan Booker

Background. Researchers propose that resilience is both a process and a personality trait (i.e., Pan & Chan, 2007). They define resilience as the ability to positively recover from negative life events or circumstances through individual and community efforts. This conceptualization introduces the idea that the tendency to recover from circumstances can be a personality factor. Here we focus on personality factors, like the Big Five and character strengths, to inform reports of resilience. We expected differences in strengths of hope, gratitude, and forgiveness to provide unique information for resilience beyond Big Five reports.

Method. As part of a larger project, 130 college adults were recruited from a central US public university (Mage = 18.47, SD = .92; 69.2% women). Participants completed computerized questionnaires about individual differences in endorsed character strengths of hope (Snyder et al., 1991), gratitude (McCullough et al., 2003), and forgiveness (McCullough et al., 2006). Participants also completed a measure about Big Five personality traits (Gosling et al., 2003) and reported on tendencies to respond to life's challenges in a resilient fashion (Smith et al., 2008).

Results. Correlations showed that reported hopefulness and motivations to forgive others were significantly and positively associated with reports of resilience and the capacity for recovering from setbacks. A regression analyses tested the influence of these three strengths simultaneously and after accounting for reports of Big Five personality traits (i.e., Extraversion, Neuroticism). Hopefulness and forgiveness continued to have unique and positive associations with reported resilience after accounting for the Big Five.

Discussion. Our results are in line with studies suggesting character is positively associated with resilience (Park et al., 2003) and views of resilience as a personality factor (Pan & Chan, 2007). Future studies will benefit from cross-cultural considerations of character and resilience, addressing the consistency of these associations across cultural settings.

Mary York
Lonedell, MO

Senior
Biological Sciences

Sp20-180

Faculty Mentor: Dr. Felix Fritschi, Plant Sciences

Funding Source: Dr. Felix Fritschi; Department of Energy grant: DE-SC0014156.

Anatomical Root Differences in Genetically Distinct Ecotypes of Switchgrass

Mary York and Felix Fritschi

Panicum vigratum (switchgrass) is a C4, warm-season, long grass species native to North America. It is commonly used for soil conservation, ecological restoration, carbon sequestering, and is a possible source of cellulosic biofuel. Switchgrass has two main ecotypes, lowland and upland, which are genetically and phenotypically distinct. These ecotypes are adapted to different habitats and therefore show differential responses to environmental conditions. Switchgrass roots can grow up to nine feet in length and account for over half of plant biomass. Little research has been done regarding root anatomy and how this differs regarding ecotypes and crosses. Understanding anatomical root differences can assist efforts to breed switchgrass for different purposes. I used roots from a four-way cross of two upland ecotypes (DAC, VS16) and two lowland ecotypes (AP13, WBC) planted in Columbia, Missouri. Roots were stored in FAA, cross-sectioned by hand, and dyed using toluidine blue before being microscopically observed. Cortex distance, average xylem vessel diameter, xylem vessel number, stele diameter, and root diameter were measured for each plant when possible. F0 generation lowland ecotypes were shown to have larger average cortex distances, xylem vessel diameters, and root diameters in comparison to F0 generation upland ecotypes. Genetic mapping will be done using data from F0, F1, and F2 generations in hopes to locate sites associated with these observed differences.

Andrew Yowell

Iowa City, IA

Senior
Biological Sciences

Sp20-68

Faculty Mentor: Dr. Pam Brown, Biological Sciences

An Essential Endopeptidase is Required for Polar Cell Wall Synthesis in Agrobacterium tumefaciens

Andrew Yowell, Wanda Figueroa-Cuilan, Pamela J.B. Brown

The canonical elongation and division mechanism in *E. coli* is well-characterized; however, this mechanism isn't conserved across all bacteria, including polar-growing Alphaproteobacteria. In the Brown lab, we use *A. tumefaciens* as a model system to understand novel determinants of polar elongation. In bacteria, cell wall expansion requires both synthesis and hydrolysis. Here, we characterize Atu4178, an essential endopeptidase which may function as a space-making enzyme to allow insertion of new glycan strands by PBP1a during polar elongation. Indeed, we find that Atu4178-sfGFP localizes to the growth pole during elongation. To understand the function of Atu4178, we constructed a depletion strain in which the sole copy of the gene encoding Atu4178 is expressed when an inducer is present. Depletion of Atu4178 results in a severe cell viability defect, decreased cell length and cell rounding, consistent with a role in polar elongation. This phenotype is similar to that observed when PBP1a, an essential peptidoglycan synthase required for polar elongation, suggesting that these two enzymes may function in the same pathway. Strikingly, labeling areas of active peptidoglycan growth using fluorescent d-amino acids (FDAAs) during depletion of Atu4178 revealed that the polar cell wall biosynthesis is halted, with growth then appearing in the subpolar region of the new pole. The ld-transpeptidase Atu2336 localizes to the subpolar region and we hypothesize that its activity may contribute to the detection of subpolar growth. We plan to treat cells depleted of Atu4178 with antibiotics which block ld-transpeptidase activity to investigate the mechanism of subpolar growth. Furthermore, analysis of changes in the peptidoglycan composition during depletion of Atu4178 will help determine if ld-transpeptidase activity is increased. Collectively, these results indicate that the essential Atu4178 endopeptidase participates in polar growth of A. tumefaciens and suggest that ld-transpeptidases may play an important role in a previously undescribed mode of subpolar growth.

Katherine Yu
Rolla, MO

Freshman
Chemistry

Sp20-18

Faculty Mentor: Dr. Bih-Ru Lea, Business and Information Technology at the Missouri University of Science & Techology

Big Five Personality Traits in Learning Complex Information Systems: A Case Study

Katherine Yu, Carol Koob, Amanda Engelke, Bih-Ru Lea

This research explores the influence of personality traits on the performance of learning a complex information system. The personality traits studied are conscientiousness, neuroticism, extraversion, openness, and agreeableness and the complex information system is represented by an Enterprise Resource Planning (ERP) System. The preliminary results indicate Openness, the interaction of Openness and Agreeableness, the interaction of Openness, Agreeableness, and Conscientiousness, the interaction of Openness, Agreeableness, and Extraversion, and the interaction Openness and Extraversion are statistically significant on influencing ERP learning performance.