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This year the SURF organizational committee received 107 applications for student presentations and posters, a marked increase over last year, which likewise represented a very significant upturn from the previous year. This remarkable number of participants, combined as it is with the enclosed list of titles and topics, invites us to pause briefly and consider the significance of this annual academic event and its implications for how we understand and undertake our shared work as students, scholars, and teachers.

The dramatic growth in size and scope of SURF calls into question such seemingly axiomatic and stable terms as “student,” “undergraduate,” and “research.” What does it mean, for instance, to be a “student”? What, along similar lines, constitutes a normal undergraduate experience or, more to the point, conventional undergraduate research? What, most notably, is “research,” and what topics merit this moniker? Can one, for instance, research something as elusive as love? What about yoga, dice, honey, caenorhabditis elegans, or galaxy halos? Are these topics fair game for undergraduate inquiry?

As to the questions concerning what constitutes a “student” or an “undergraduate,” this festival’s intent and its content insist these terms are woefully insufficient. When pursuing answers to their questions, Carroll students become researchers, educators, teammates, mentors, experts, collaborators, writers, and much, much more. They are, in essence, “undergraduates” in name only. The nature of their topics, and the challenge pursuing them, require they be and do more than they might otherwise. As to the questions concerning which topics justifiably fit under the label of “research,” the answer is, you will soon note when looking through the following titles and while attending presentations and poster sessions, All of the Above.

Interestingly, the one word in the title of our event that has become more rather than less precise during the six years of this event is “festival,” which the Meriam-Webster dictionary defines as “a periodic, typically annual, often day-long celebration or program of events having a specified focus.” SURF has and continues to exemplify a celebration of student scholarship and the joy that attends the pursuit of knowledge for its own ends and for the betterment of our community and the world.

I would like to thank the students who had the courage and fortitude to pursue their projects and share their research in these ways, and I would like to thank the faculty and staff who made that research both possible and pleasant.

Finally, I want to express a special thank you to the members of the SURF committee for making this annual event truly a festival. Dr. Brandon Sheafor, Dr. Jeanette Fregulia, Dr. Eric Sullivan, and Dr. Ryan Hallows – with the tireless support of Ms. Maria Larson – worked from the conclusion of last year’s SURF up until the commencement of this one, making the most of the event’s momentum while also making new and exciting changes to the 2017 program. Thank for all you have done, and thank you in advance to those faculty, staff, students, and visitors who come and celebrate with us.

DR. COLIN IRVINE, Class of 1991, Senior Vice President for Academic Affairs & Dean of the College
### Session 1: Presentations, 1 to 1:45 p.m., **Campus Center Lower Level**

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**Note:** The field of study is listed under the presenter’s name.
1E: AVILA/DESMET ROOM

Evan Krings and Jessica Simkins
Civil Engineering

Cottonwood Creek Fish Screen

Simrit Gill
Intercultural Communication

(In)authenticity in Representation of Cultural Festivals Holi

Michael Bradt, Nathan Boone, and Jessica Bauer
Data Analysis/Modeling

Membership Analysis of Exploration Works

Session 2: Presentations, 2 to 2:45 p.m., CAMPUS CENTER LOWER LEVEL

2A: FLEX THEATRE

Scott Marshall and Antonio Ranieri
Water Resources and Water Treatment Application

Stormwater Bio-Retention and Treatment System for the Mesa North Housing Complex, University of California, San Diego

Alec Dowell Basterrechea
Spanish

It’s More Than a Personal Foul: Perspectives on Domestic and Sexual Violence in Film and Sports

Becca Poliquin and Freddy Gray
History/Theology

Novissimi Erunt Primi

2C: ROSS ROOM

Baird Linke
Spanish

This Land for God: Spain, the New World, and the Reformation

Alex Ramm-Hutchinson and Scott Gulliford
Engineering

Design for a Drinking Water Distribution System for the U.S. Fish and Wildlife Service

Colby Smith
Counter-Insurgency Policy

To Catch a Waterfall: The Effect of Political Inclusivity on Counterinsurgency Operations

2B: SIENA ROOM

John Eaton and Alec Scheibner
Civil Engineering

Rainwater Storage Expansion

Katherine Gildner
Environmental Science

Reconstructing Holocene Fire and Landscape History using Charcoal and Lake Sediments in Big Belt Mountains, MT

Mary Kathleen Moriarty
Refugee Commentary

Representations of Refugees: Patterns in Letters to the Editor about Nazi-Era Jews and Contemporary Muslims

2D: RICE ROOM

Dylan Allen
Topology, Data Analytics

Using Topological Data Analysis to Give Shape to Data

Mark Romano
Mathematics

Mirror Symmetry in Black Holes, Elementary Particles, and Mathematics

Maggie Bristow
Nursing

Pressure Ulcer Prevention: A Study to Measure the Effects of Education on Pressure Ulcer Knowledge of Certified Nurses Assistants

2E: AVILA/DESMET ROOM

Jordan Trinka
Mathematics and Fluid Dynamics

Modeling Contaminant Flow in the Puget Sound Using the Finite Element Method
Amy Mohr
Psychiatric Nursing
The Lived Experience of Chronic PTSD in Vietnam and Korean War Veterans: Implications for Nursing Practice

Kavida Naidu
Rhetoric and Media Studies
Beyoncé and Representation of Black Femininity in Mainstream Media

Session 3: Presentations, 3 to 3:45 p.m., CAMPUS CENTER LOWER LEVEL

3A: FLEX THEATRE
Terry Cox, Alex Ramm-Hutchinson, Lizzy Younce, Joseph Zepeda
Mathematics
Math in the Mountains: Montana No Kid Hungry

Amy Mohr
Film Studies
Telephones, Transvestites and Theatrics: Performative Power and the Strength of Individual Identity in the Films of Pedro Almodóvar

Kaitlin Jones
Sociology
Gym Stigma

3B: SIENA ROOM
Kelly Taft
Political Science
Populism in the 2016 General Election

Leah Henningsen
Psychology
Attaining Idealized Status: Motivation to Diet and Exercise After Exposure to Women with Ideal Body Types in Relationships

Katherine Martineau
Anthrozoology
Behavioral and Physiological Stress in Pair-Housed Shelter Dogs

3C: ROSS ROOM
Baird Linke
Spanish
Hidden Voices: Latin American Women in Protest

Roberts Hanna
Anthrozoology and Psychology
Ponies Proliferate Positive Affect: The Effectiveness of Equine Therapy on Positive Affect in Adolescents with Serious Emotional Disturbances

Jessica Lewis
English
Better Call Becky with the Good Hair: African American Female Community Through Literature and Pop Culture

3D: RICE ROOM
Xavier Johnson
Sociology
The Effect of Canine Presence on Personal Information Sharing

Annelise Bayless
Theatre
Helping Marginalized Through Shakespeare Intervention: Why We Must Bring the Bard to the Societal “Other”

Timothy and Todd Pays
Civil Engineering
Gold Creek Fishing Access Site
Session 4: Posters, 4 to 4:45 p.m., CAMPUS CENTER UPPER LEVEL

Colton Welhaven, Chandler Arbizzani, David Barnett, Amanda Clark, Aaron Dennis, Collin Jones, Paige Montgomery, Charles Petersen, Alyssa Porter, and Flora Waske
Accounting
Integrated Reporting: Capital, Creation, Communication

Inderbir Bains and Will French
Molecular Biology
Affects of Metals and Metalloids on Tetrahymena thermophila

David Woolston and Shelby Olson
Molecular Biology
An Assessment of the Level of Cwf16 Expression in Tetrahymena thermophila when Exposed to Ultraviolet Radiation

Alex Kurtz and Kellea Nichols
Molecular Biology
A Genetic Analysis of Differentiation among Montana Culex tarsalis Populations Using Inter-Simple Sequence Repeats

Magaret Korus
Animal Physiology
Physiological and Behavioral Responses of Laboratory Mice (Mus musculus) to the Odor of Predator Urine

Kaitlin Stromberg and Jakob Plagenz
Molecular Biology
Decreasing Atrial Septal Defects in Humans

Jack Rees and Keaton Brady
Molecular Biology
Impacts of Environmental Motion on CDC2 Expression and Viability in Tetrahymena thermophila

Emma Esposito and Natalie Oberding
Neurobiology
Behavioral Effects of F07A5.4 Gene Knockdown in Caenorhabditis elegans

Emma Esposito, Theda Knauth, and Amelia Ohnstad
Molecular Biology
Effect of EDTA on SIT1 Scramblase Gene Expression, Cell Viability, and Cell Growth in Tetrahymena thermophila

Bryce Walker and Sam Brunson
Molecular Biology
CDC2 Expression, Cell Growth and Viability of Tetrahymena thermophila in Acidic Environments

John Bartlett, Corbin Arbizzani, and Dylan Butorac
Neurobiology
Effects of Y41E3.7 Gene Knockdown on AMPAR Transportation

Hannah Sylvester and Reegan DeBruycker
Molecular Biology
Effect of Nitrate Pollution on Tetrahymena thermophila

Victoria Kong
Chemistry
Undergraduate Chemical Education: The Nernst Equation

Shae Hess
Chemistry
Visible Light Oxidative Dimerization TCV-2T

Samuel Carroll
Chemistry
Retrosynthesis of 2-iodo-aryl-indole Via Cyclization

Nicole Seehafer
Chemistry

Monika Weber
Chemistry
The Synthesis, Characterization, and Ligand Exchange of Cadmium-Selenide Quantum Dots
Lauren Palys
Chemistry
Synthesis of Blue Light Emitting Molecules with Applications in OLED Technology

Kelby Depner
Chemistry
Arsenic Concentrations in Helena Area Soil and Lake Helena Core Samples

Joel Kramer
Chemistry
Stereoselectivity of a Ruthenium-Arene Complexed Dienophile in a Diels-Alder Reaction

Gunnar Hilborn
Chemistry
Study of Solid-State Solventless Reaction Rates

Emma Patello
Chemistry
Investigations into Inexpensive Methods for Stereoselective Ruthenium-Arene Complexation

Anne Morse
Chemistry
Cyanine Dyes Oxidative Dimerization

Isabelle Gray
Chemistry
The Moscow Mule: Investigation of Copper Leeching in a Popular Beverage

Allison Bayer and Layne Ryerson
Environmental Science
Coal Dust Mobilization and Deposition from Coal Trains Near Helena, MT

Joseph Ikehara and Sophia Rodrigues
Discrete Mathematics
The Combinatorics of Liar's Dice

Chloe Hendrickson
English Literature and Classical Studies
The Mad Woman in Medea: An Intersectional Feminist Analysis of Medea and Contemporary Revisions

Kristina Mills and Bailey List
Environmental Science
Sediment and Heavy Metal Transport During Flood Events in Lake Helena

Fallon Machado
Education and Theology
It Takes Three

Madison O’Dell
Health Sciences
Mechanical vs. Manual CPR in Out-of-Hospital Cardiac Arrests

Cassidy Hammons
Physical Therapy
Dry Needling in the Treatment of Chronic Myofascial Neck Pain: A Systematic Review

Mariah Schell
Public Health/Exercise Science
Effect of Volleyball Playing Surface on Joint Health

Deaundra Shackelford
Health Sciences/Theatre
Simulated Patients: The Actor's Perspective

Callie Morris
Veteran Health
The Effects of Therapy on the Quality of Life in Veteran Amputees

Terry Cox, Dylan Allen, and Nathan Boone
Mathematics
Airport Security: A More Efficient System

Marcellus Randall
Discrete Mathematics
Combinatorics of a Changing Card Game

Traci Tonkovich and Andrea Harrington
Nursing
Vegetarian Diet and Its Effects on Serum Lipid Levels

Seth Gruber and Delaney Cummings
Nursing
The Use of Opioid and Alternative Therapies for Chronic Pain

Sarah Hallauer and Maddie Thompson
Nursing
Iron Deficiencies Related to Depression in Women of Childbearing Age

Madison Apsey, Ylena Gazdik, and Chelsea Leach
Nursing
Yoga as an Alternative Therapy for Depression
Koratney Speidel, Kalei DePriest, and Lauryn Grossman
Nursing
An Extension of the Nurse’s Hands: The Prevalence of Bacteria on Healthcare Providers’ Stethoscopes

Kayler Dub and Erica Ciez
Nursing
Motivational Interviewing and Exercise

Jessica Aguirre and Kaylee Main
Nursing
How Do College Students in the United States Perceive the Influenza Vaccine?

Jessica Romain and Haley Adams
Nursing
Mindfulness-Based Relapse Prevention and Substance Abuse Recovery

Iulia Patru, Emily Blaylock, and Morgan Calnan
Nursing
The Relationship Between Sleep Deprivation and Type II Diabetes

Felicity Linger, Emily Crews, and Brooklyn Merja
Nursing
Circumcision and UTIs: Protective or Unnecessary

Erin Askin, Fiona Bennett, and Kathryn Gilding
Nursing
How Intuitive Eating, as Opposed to Dietary Restraint, Affects Body Image of Women Ages 15-25

Catherine Sloan and Emily Spindler
Nursing
Relationship Between Telemedicine and Nursing Shortages

Brooke Ruppenthal, Sara Chalich, and Courtney Cloud
Nursing
Water Immersion Labor Pain vs Non-Water Immersion Labor Pain

Allison Trent and Allison Dierenfield
Nursing
Use of Honey to Reduce Healing Time

Allie Roberts, Jordyn Johnson, and Karissa Procopio
Nursing
The Occurrence of Reported Medication Errors in 12-hour Nursing Shifts and Overtime

Donovan Lucibello and Jacob Doney
Nursing
From Outputs to Inputs: Bacteria Solutions for Clostridium difficile Infections

Kavida Naidu
Theatre
Prison Theatre: Practicing Catharsis with U.S. Inmates

Tristin Agtarap and Michael Donnelly
Psychology
Understanding Intelligence Through Writing

Tristin Agtarap and Jared Thielke
Psychology
Storytelling and Games Study

Josie Ray and Anna McCarthy
Psychology
Effects of Priming on Female Social Behavior

Jared Thielke, Andrew Campbell, and Michaela Kueffler
Neurobiology
The Effects of Vdac-1 on AMPA Receptor Trafficking

Jacob Souza, Connor Brandon, Kaley Brouwers, Rhiannon Sturgess, Jared Thielke
Psychology
Relationship between Memory and Exercise

Amy Penaskovich, Shaelynn Blixt, Emily Holland, Kayla Mack, and Lauren Paradis
Psychology
Mediating Factors of Stress on Performance

Ali Becker and Kevin Murphy
Psychology
Effects of Mindfulness Mediation on Test Scores

Alexandra Poulsen and Janie Reid
Psychology
Are More Narcissistic Individuals More Judgmental Towards Others When Viewing Social Media Accounts?

John Bartlett
Neurobiology
Developing a MAM Mouse Model of Cortical Dysplasia
**Inderbir Bains (Major: Biochemistry and Molecular Biology)**  
**Field of Study: Organic Chemistry**  
**Rate Comparison Studies of Diels-Alder Reactions with η⁶-Ruthenium Arene Complexes versus Free Arene Dienophiles.**

η⁶-Ruthenium arene complexes have proven to be valuable intermediates in organic synthesis due to the metal's ability to act as an electron-withdrawing group (EWG) making reactions such as nucleophilic aromatic substitution and deprotonation of benzylic and aromatic positions facile. Despite being a known EWG, there has been little research investigating these complexes ability to modulate reactivity of alkenes pendent to the complexed arene. In particular, only two examples have been reported using an η⁶-ruthenium arene complex as an accelerating group for Diels-Alder (DA) reactions, which is known to be facilitated by electron-withdrawing dienophile substituents when reacted with an electron rich diene. Virtually no rate comparison studies have been conducted in comparing the rate of DA reactions of η⁶-Ruthenium arene containing complexes and non-η⁶-Ruthenium arene complexes. We have successfully synthesized a model dienophile substrate, [{\text{CpRu}(η⁶-(ethyl \ trans-cinnamate))}PF₆] and have substantial evidence for the formation of the respective DA product with 2,3-dimethyl-1,3-butadiene via ¹H NMR spectroscopy. We have also qualitatively observed reaction rates of this specific DA reaction versus the free arene dienophile, ethyl \ trans-cinnamate, both in non-catalyzed and zinc(II) chloride catalyzed conditions. In these studies, the metal-arene dienophile was substantially faster as product was not observed with the metal-free dienophile after 8 days in the same reaction conditions. Currently, a new diene cyclopentadiene is being explored as a possible alternative to 2,3-dimethyl-1,3-butadiene in hopes to make rate comparison studies more feasible. Initial data suggests that formation of a DA product occurred with cyclopentadiene and [{\text{CpRu}(η⁶-(ethyl \ trans-cinnamate))}PF₆] at room temperature via ¹H NMR spectroscopy.

**Alex Kurtz (Major: Biochemistry/Molecular Biology)**  
**Field of Study: Animal Physiology**  
**Amphibian Risk Assessment**

The fungus, *Batrachochytrium dendrobatidis*, has been found to affect amphibian populations around the world. This fungus can have many effects on frogs and salamanders, including changes in osmotic regulation that may lead to death. *B. dendrobatidis* has been shown to be the driving force for many amphibian population crashes and extinctions around the world. The purpose of this project was to build a predictive model of *B. dendrobatidis* infection, one that would be used to assess population susceptibility in order to identify populations of amphibians at risk of infection. This was accomplished by statistical analyses of several components that contribute to infection vulnerability, including amphibian antimicrobial peptide production, cutaneous bacterial colony structure, infection status for each frog and water nutrient composition. This project collected baseline data that will allow us to establish meaningful relationships between susceptibility factors and disease which will permit the identification of populations at risk.
Natalie Oberding (Major: Biology)
Amelia Ohnstad (Major: Biochemistry)
Field of Study: Neuroscience
**Investigating the Role of DNC-2 and DLI-1 in AMPA Receptor Mediated Behavior in Caenorhabditis elegans**

AMPA Receptors (AMPARs) are protein complexes involved in excitatory neurotransmission. AMPARs are hetero-tetrameric structures consisting of the pairings of GluA1, GluA2, GluA3, and GluA4 subunits. Dctn2 and Dyncl1 were found to interact with GluA2 in an immunoprecipitation screen that was performed on postnatal day 14 rat brains. DNC-2 and DLI-1 were identified as the *Caenorhabditis elegans* homologs of Dctn2 and Dyncl1, respectively, and are components of motor proteins that transport cargo throughout the cell. The goal of this project was to determine whether knocking down DNC-2 and DLI-1 by RNAi affects AMPA Receptor-mediated behaviors, including mechanosensation and chemosensation, in *C. elegans*. To generate the RNAi knockdown worms an RNA extraction was performed followed by a reverse transcription. The resulting cDNA was then used in a PCR with primers that isolated DNC-2 and DLI-1 gene sequences. After the coding regions of DNC-2 and DLI-1 were successfully amplified they were inserted into the L4417 RNAi expression plasmid. The resulting clones of DNC-2 and DLI-1 were then transformed into HT115 feeding bacteria. Wild type *C. elegans* were seeded onto the transformed HT115 feeding bacteria and knockdown of DNC-2 and DLI-1 was verified using RT-PCR. The effect the knockdown of DNC-2 and DLI-1 has on AMPA Receptor mediated behaviors, including mechanosensation and chemosensation, was determined.

• 1B: SIENA ROOM

Leah Esposito (Major: Biology)
Field of Study: Molecular Biology
**Exploring the Role of Dyncl1 in the Trafficking of GLUA2 Containing AMPA Receptors**

AMPA receptors are glutamate receptors that are found in the post-synaptic region of a neuron. They are one of the main receptors that are responsible for excitatory signaling in the central nervous system. The trafficking of these receptors is an area of knowledge that is not well developed, but is essential to a complete understanding of these receptor proteins. My research was focused on exploring the role that Dyncl1 has in the trafficking of GluA2-containing AMPARs. In order to investigate this role, Dyncl1 was amplified via PCR, cloned into a mammalian expression vector and transfected into HEK293 cells and NT2 neurons. Live labeling studies and co-immunoprecipitation experiments were performed to determine association with GluA2 and surface expression. Immunostaining experiments were performed to view Dyncl1 localization. The quantifiable results were statistically insignificant and further experimentation is needed. In conclusion, the role that Dyncl1 plays in the trafficking of GluA2-containing AMPARs remains unclear.

John Corbett (Major: Biology)
Sarah Hayden (Major: History)
Courtney Rustik (Major: Elementary Education)
Field of Study: Philosophy
**Perspectives of Love**

This presentation is centered on providing the audience with three perspectives of love. The presentation is inspired from a semester of research that was completed for a class centered on the philosophy behind love. The main focuses of the presentation will include the topic of equality in a relationship, the dangers of unrequited love, and the role of choice in romantic love. The presenters will depict their vision of love based on the research they have done and then the presenters will make connections between all three of the visions in hopes to leave the audience with a more diverse understanding of love.
Alex Thielman (Major: Biology)  
Chloe Hendrickson (Major: English Literature English/Writing Classical Studies)  
Haley Meredith (Major: Biochemistry/Molecular Biology)  
Field of Study: Gender Studies

**Normalizing Resistance**

Hendrickson  
Judith Butler asserts that the definition of empowerment must include “bodily integrity,”: the ability to live without fear of violence, mistreatment, or abandonment. “Bodily integrity” is guaranteed only to those who fit the description of white, heterosexual, cis-gendered men because the dominant group determines differences in bodies and the significance of those differences. If feminism truly seeks to empower women and allow them to attain “bodily integrity,” it must challenge our understanding of differences between bodies and combat the core mechanism of oppression that operates through the exploitation of those differences.

Meredith  
Because activism seeks to cause permanent change in social values, and because so much of society and media are image-based, activists should prioritize the enthusiastic tolerance of all different bodies and body types in society. The body is an inescapable part of identity, and rather than it being a hindrance to daily life, it can become a vehicle through which we respect and acknowledge others.

Thielman  
The analysis and confrontation of oppression and issues of gender that are commonplace inside the feminist movement are easily and readily applicable to other groups within our society that currently fall outside of the bounds of mainstream feminism. These groups include men, the disabled, and people of color. Increasing awareness of how the fundamental ideas of feminism can be applied to address the oppression of these groups is important to create a pathway to expand the perceived limitations of feminism, creating a more inclusive and intersectional form of mainstream feminism.

• 1C: ROSS ROOM

Daniel Lockman (Major: Biology)  
Field of Study: Biology, West Nile Virus

**Genetic Differentiation Among Culex tarsalis Populations in Montana**

West Nile Virus presents a potential risk to humans, domesticated animals, and some wildlife species in Montana. The Carroll College Biology Department has been working to create a geographic risk assessment model for West Nile virus in the state of Montana. This model has been created using ecological data such as temperature, precipitation, and vegetation type. The main vector for this disease is the mosquito *Culex tarsalis*. If a comprehensive geographic risk model for the state of Montana is to be developed, it would be helpful to further investigate what factors are important to the distribution and gene flow of *Cx. tarsalis* across the state. Specifically, I examined how the Continental Divide might change infection rate dynamics by separating and possibly isolating *Culex tarsalis* populations in Montana. The aim of this project was to use Inter Simple Sequence Repeats (ISSRs) to genetically analyze populations of *Culex tarsalis* from eleven different sites in Montana, three of which are on the West side of the Continental Divide and eight of which are on the East side of the Continental Divide, to determine whether or not gene flow is occurring between those populations. Thus far, ISSRs have shown to be more variable, and potentially more informative, than previous genetic markers used to address a similar question. Specific population comparison results will be presented and discussed.
Baird Linke (Major: Biology & Spanish)
Field of Study: Theology

A Theology of Evolution

It is said that God wrote the Book of Scripture and the Book of Nature to teach humanity about Himself. However, in the United States the debate between science and faith over the issue of evolution has deepened cultural divides and discouraged conversation between the two camps. This presentation is a call to read both books by examining the value of evolutionary science as a source of theological reflection.

Monica Mendoza (Major: Biology and Spanish)
Field of Study: Spanish

An Analysis of the Directing Styles Used by Spanish Filmmaker Pedro Almodóvar

Pedro Almodóvar is a successful Spanish film director who has won various awards including Goya, Cannes, and Academy Awards. Almodóvar was born in 1949 in Calzada de Calatrava, Spain. He grew up in a Spanish society that was ruled by the dictator Francisco Franco. Under Franco’s rule the people of Spain were restricted socially, domestically, and culturally in their way of life. The binary between men and women was never more prominent. Following Franco’s death in 1975, Almodóvar emerged as an embodiment of all things that were considered taboo during Franco’s era. He was not afraid to make a critique of the then newly liberated Spanish society. Because of his fame and worldwide recognition Almodóvar has changed his directing styles throughout the years. With a chronological analysis of his films and various critiques of his work, it is apparent that Almodóvar no longer solely belongs to Spain. He has become a world-renowned director praised for his ambitious and outspoken work. However, because of his worldwide success he has inevitably lost the favor of Spanish critics and many of the Spanish public. This analysis shows the various phases of his directing styles and how they have impacted his fame and failings.

• 1D: RICE ROOM

Carlos O’Leary (Major: Biology/Spanish)
Field of Study: Spanish

Determining Treatment Progress of Children Sponsored by Families with Heart

The purpose of this study will be to assess whether the children that are being sponsored by Families with Heart are making adequate advances in their respective treatment. This assessment will be carried out through house visits to each individual child involved in the program as well as their respective health care provider. Once the data has been collected a formal report will be written which will contain the progress of the children involved and it will be turned over to Families with Heart so that the organization can evaluate its impact.

Joseph Zepeda (Major: Physics and Mathematics)
Field of Study: Computational Astrophysics

A Study of Galaxy Halos Infalling into Clusters

What happens to galaxies as they move from filaments to clusters? Are they torn apart by the forces they experience in a cluster or do they form a super galaxy? The purpose of this research is to examine how galaxies move through different regions of space. In order to identify the neighborhoods of galaxies over time, I created a tool that graphically analyzes simulation data to trace the positions of the halos of galaxies and wrote a program that predicts which galaxies will fall into a cluster.
Lauren Rhoda (Major: Chemistry)
Field of Study: Chemistry Education

**Development of a Workshop on Quantum Dots for Middle School Girls Interested in the STEM Disciplines**

Quantum dots (QDs) have a variety of applications, ranging from usage in solar cells to their use as biomarkers for tagging diseased cells. They have even been found to exert powerful antimicrobial effects. Many QDs are synthesized using toxic heavy metals. Thus, an emerging area of research involves the synthesis of quantum dots made from less toxic materials, such as gold, silver, or even graphene. In this study, silver QDs were prepared via the reduction of Ag⁺ ions in solution using a variety of procedures. One procedure involved encasement using Polyvinylpyrrolidone (PVP), a water-soluble polymer, and another utilized biological materials like starch and L-Lysine to encase the silver nanoparticles. Successful synthesis of the silver QDs was confirmed by UV-Vis Spectroscopy and transmission electron microscopy. These materials are being developed to introduce an exciting new field of chemistry to middle school girls at the Exploration Works Girls STEM Roundup event. We will introduce QDs and discuss what they are, how they are made, and what they are used for. In addition to the silver quantum dots, other reactions using silver will be demonstrated in order to expand upon the applications of silver as an element, and the versatility of chemistry as a discipline.

• 1E: AVILA/DESMET ROOM

Evan Krings (Major: Civil Engineering)
Jessica Simkins (Major: Civil Engineering)
Field of Study: Civil Engineering

**Cottonwood Creek Fish Screen**

A hydroelectric pumped storage station is proposed to be located in Meagher County, MT, and will require a large volume of water to initially fill the reservoirs as well as account for water losses. To fill this need a water diversion must be created that can supply the adequate volume of water, remove any aquatic life or debris prior to diversion, and maintain the health of the water source.

To fulfill these design requirements we are designing a farmers fish screen that will be located on the nearby Cottonwood Creek. This farmer's fish screen will utilize a weir wall system to divert the adequate volume of water from the source creek to the plant while filtering out natural debris and aquatic life and safely returning it to the parent stream. We will also be designing the return channel that will send this excess water and debris back into Cottonwood Creek.

Simrit Gill (Major: Communication & Public Relations)

Field of Study: Communication

**Intercultural Communication**

**(In)authenticity in Representation of Cultural Festivals Holi**

Not only are traditional cultural celebrations commonly represented through media, but in an increasingly globalized world, these celebrations are often practiced in cultures other than the cultures in which they originated. Accordingly, the principle of “authenticity” (Tatsuki, 2006) is increasingly important, just as it is increasingly problematic. In this paper, we compare two traditional cultural celebrations practiced outside of the United States: Holi in India and Dia de los Muertos in Mexico to U.S. practices which co-opt aspects of, and Westernize, these festivals. First, we examine critically a website advertising Holi festival events in the U.S. Then we critically analyze representation of a Dia de los Muertos festival in the opening scene of the 2016 “James Bond”-genre film, Spectre. In both cases, we find that flashes of “authentic” images are interspersed with American ideological features. These critical case analyses shed light on the problematic nature of authenticity in the contemporary globalized world.
Michael Bradt (Major: Engineering Science)
Nathan Boone (Major: Mathematics Finance concentration)
Jessica Bauer (Major: Mathematics/Computer Science)
Field of Study: Data Analysis/Modeling

**Membership Analysis of Exploration Works**

Over the past semester, our Math in the Mountains team partnered with Exploration Works!, a local interactive museum, to help them better understand, analyze and project membership and attendance levels. We reviewed their data that included home zip codes of attendees, membership purchases and retention information, and overall attendance. With this data, we compared Exploration Works! to a similarly sized market, University of Montana’s SpectrUM, to see how they relate to other museums in the industry.

We also analyzed the impact of an advertising campaign that Exploration Works! launched this past summer in the Glacier area. Using heat mapping, we created a visual model to help show fluctuations in membership and walk-up attendance from across the state of Montana on a year-by-year basis.

Finally, we created a projection model that can be used to help forecast membership attendance and purchases, as well as other classifications of attendance that Exploration Works! records. Our models utilize a time-weighted confidence interval that relies on past data to help us project our numbers.

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**Session 2** Presentations, 2 to 2:45 p.m.

• 2A: FLEX THEATRE

Scott Marshall (Major: Civil Engineering with Environmental Emphasis)
Antonio Ranieri (Major: Civil Engineering with Environmental Emphasis)
Field of Study: Water Resources and Water Treatment Application

**Stormwater Bio-Retention and Treatment System for the Mesa North Housing Complex, University of California, San Diego**

The University of California, San Diego is redeveloping student housing on campus that requires new means of storm-water treatment to compensate for increased runoff as a result of newly constructed impermeable surfaces. Environmental and societal requirements stipulated by the University and the State of California call for sustainable construction technologies on site. In order to meet these requirements a dual-purpose wetland water treatment facility will need to be built to meet these needs. This wetland treatment system will use natural processes to dissipate energy and clean storm-water runoff during high flow events year-round. This report will evaluate a number of alternatives for water treatment on site and recommend the best alternative design based on cost, sustainability, efficiency, feasibility and aesthetics. A complete design review, scope of work, technical and construction analysis, and designed drawings will be developed for the site based on provided data from Latitude 33 Engineering and the University. This wetland system will allow for the University to recycle storm-water runoff and grey-water discharge for the newly completed North Mesa Housing Complex. Treated water will be available for irrigation on site. With current trends in decreased precipitation in Southern California this type of project is vital for water resource management and will ensure that the campus remains environmentally sustainable for years to come.
Alec Dowell Basterrechea (Major: Health Sciences and Spanish)  
Field of Study: Spanish  
**It's More Than a Personal Foul: Perspectives on Domestic and Sexual Violence in Film and Sports**

Pedro Almodóvar’s movies have very little connection with sports except when comparing acts of sexual and domestic violence. This presentation will provide an in-depth look at the similarities and differences of domestic and sexual violence as shown in movies by Almodóvar and the lives of modern-day athletes. Athletes are some of the most famous celebrities in the world. People like Floyd Mayweather, Chad OchoCinco, Randy Moss, Jim Brown, Greg Hardy and Hope Solo sadly have an association with domestic violence and sexual assault. Pedro Almodovar addresses themes of domestic violence and sexual assault in his films that force the viewer to draw ethical and moral conclusions about judgment and justice. I will address the similarities of filmic portrayals of violence and assault with applicable evidences about the lives of modern-day athletes and question whether athletes receive judgment and justice equal to the scenarios found in Almodóvar’s films.

Becca Poliquin (Major: History/Theology)  
Freddy Gray (Major: Political Science/International Relations/Theology)  
Field of Study: History/Theology  
**Novissimi Erunt Primi**

The end of South African apartheid in 1994 was a moment of victory for humanity. The Truth and Reconciliation Commission (TRC), which brought a peaceful transition to a new government, was guided by Christian leaders and principles. This project examines the pre-TRC history of Christianity in South Africa, focusing especially on white majority Dutch Reformed Churches (DRC). We contend that the DRC’s usage of Christianity was a driving force behind apartheid, to a degree of which many are unaware.

- **2B: SIENA ROOM**

John Eaton (Major: Civil Engineering: Environmental Emphasis)  
Alec Scheibner (Major: Civil Engineering)  
Field of Study: Civil Engineering  
**Rainwater Storage Expansion**

The Marian Home for the Elderly in Castries, Saint Lucia, is vulnerable to drought. The Marian Home serves the impoverished elderly of the island and can’t function without water. The Carroll College chapter of Engineers Without Borders has been working with the Marian Home for three years and has made great strides toward providing a reliable water supply to the Home. At this time, the Home has enough potable water storage to last through a drought. However, that supply will only last if the potable water is reserved for uses such as drinking. If potable water is used for laundry and mopping, the Home will exhaust their supplies quickly. Currently, the non-potable water (rainwater) storage is contained in a concrete cistern that doesn’t have enough volume to last the Home through a drought. Carroll E.W.B. identified the need for additional rainwater storage and turned to the Civil Engineering Senior Design class for assistance in designing a viable alternative to provide enough rainwater storage for the Marian Home. A viable alternative must add at least 5,000 gallons to the existing concrete cistern while also sealing the cistern from animal entry. The structure would need to be resistant to the earthquakes that can strike the region. Finally, it must be constructed using local knowledge and materials to ensure that it can be easily maintained after Carroll E.W.B. has finished their program at the Home. Knowing this, we used the engineering process to design a viable alternative consisting of a vertical concrete expansion on top of the existing cistern walls that would be within the budget of both the Marian Home and Carroll College E.W.B.
Katherine Gildner (Major: Environmental Science)  
Field of Study: Environmental Science  
**Reconstructing Holocene Fire and Landscape History using Charcoal and Lake Sediments in Big Belt Mountains, MT**  
Fire history is used to closely trace how landscapes change over time. Analyzing charcoal in lake-sediment cores allows us to reconstruct past fire regimes and understand how shifts in climate and landscape influence fire frequency and intensity. As we are in a current era of change, understanding the relationship between fire and landscape has never been more important. Though fire history has been thoroughly reconstructed in Northwestern and Southwestern Montana, in the areas surrounding Glacier and Yellowstone National Parks, there is a geographic gap between north and south where fire history has yet to be studied. This study aims to reconstruct fire and landscape history in the Big Belt Mountains using charcoal from a lake sediment-core and address that gap.

Mary Kathleen Moriarty (Major: International Relations)  
Field of Study: Refugee Commentary  
**Representations of Refugees: Patterns in Letters to the Editor about Nazi-Era Jews and Contemporary Muslims**  
Current refugee policies are contentious in U.S. politics, but they have also been controversial in past eras. My study draws on theories about how people perceive refugees and immigrants by analyzing letters to the editor in major U.S. newspapers. I compare a period in the late 1930’s when many Jews were seeking to leave Europe with recent debates over Muslim and especially Syrian refugees. I identify the proportions of letter writers in favor of or opposed to admitting refugees, as well as measure the share of letter-writers who used the following frameworks for their arguments: national security, national identity, the economy, and the responsibility to help. Although many similar arguments can be found in both periods, there are also some differences. Whereas newspapers in the 1930’s presented a roughly equal balance of favorable and opposed letters, today most of the letters favor admitting refugees, but suggest a more nuanced perspective. Despite a general consensus in support of refugees, most letters also acknowledge certain risks or costs of the program. Overall the research casts light on both current and historical public opinion over refugee programs and provides a reminder that this has rarely been a simple issue for Americans.

- 2C: ROSS ROOM

Baird Linke (Major: Biology/Spanish)  
Field of Study: Spanish  
**This Land for God: Spain, the New World, and the Reformation**  
There are few places on earth today more synonymous with Roman Catholicism than Latin America, but where did this devotion come from? The story of Latin American faith begins at the turn of the 15th Century, when Muslims and Jews have just been banished from Iberia, an Italian explorer has planted the banner of Castile and León in Caribbean soil, and a young monk in Germany is preparing to launch one of the defining movements in history.
Alex Ramm-Hutchinson (Major: Engineering Science: Mechanics)
Scott Gulliford (Major: Engineering Science: Mechanics)
Field of Study: Engineering
**Design for a Drinking Water Distribution System**  
**for the U.S. Fish and Wildlife Service**

Our task for this research project was to design a drinking water system for the U.S. Fish and Wildlife Service to replace the existing system. The site is located next to Upsata Lake, thirty-four miles west of Lincoln, Montana, in Powell County. The location’s facility consists of five buildings near the lake and has people working and living on site year-round. The facility currently draws water from the lake using two submerged pumps. The entire drinking water system is old and needs to be upgraded. We have been given a scope of work, design criteria, and additional resources from Morrison-Maierle Inc. to assist with developing a drinking water system. The new water system will consist of filtration, treatment, pump, and distribution systems. Additionally, we will identify permits required from the State of Montana and meet requirements from the Department of Environmental Quality. In this presentation, we will discuss the scope of work, preliminary design, and final design process for the system.

Colby Smith (Major: International Relations and Political Science)
Field of Study: Counter-Insurgency Policy
**To Catch a Waterfall: The Effect of Political Inclusivity on Counterinsurgency Operations**

The wars in Afghanistan and Iraq illustrate the increasing importance of counterinsurgency strategies and tactics for militaries around the world. Unfortunately, much of today’s counterinsurgency training is based on the lessons learned during the post-World War II period of decolonization and the Cold War, raising questions as to necessity of reformulating modern counterinsurgency doctrine. Scholars have argued that more inclusive political regimes are more likely to successfully put an end to an insurgency—but has this always been important for securing global peace in the post-war era? My research examines the impact that democratic political institutions have on bringing insurgencies to an end, and whether or not the political realm is an effective battleground for combating homegrown insurgencies. This analysis codes eighty-five insurgencies taking place on five continents between 1946 and 1970 and compares conflict outcomes with the nature of the political regime in place at the time. I conclude by discussing the key insights of my research and the ways in which this work could be extended.

Dylan Allen (Major: Math)
Field of Study: Topology, Data Analytics
**Using Topological Data Analysis to Give Shape to Data**

Topological Data Analysis (TDA) is a new yet fast growing field in topology which can be used to give researchers an idea of the ‘shape’ of large, high-dimensional data sets. TDA has been successful in analyzing data sets in healthcare and business, and in some studies has proven to be more effective than other forms of data analysis. The main technique used to visualize higher dimensional data is an algorithm called MAPPER and has been the focus of my research. MAPPER is a dimensionality reduction technique, which provides a way to give higher dimensional data sets shape. In my talk I will present to you some case studies where TDA has been used to analyze data. I will also analyze a data set using TDA that has not been explored before.
**Mark Romano (Major: Mathematics)**
Field of Study: Mathematics

**Mirror Symmetry in Black Holes, Elementary Particles, and Mathematics**

Mirror symmetry is the study of two seemingly different objects that are conjectured to be the same. That is, we could think of them as mirror images of each other. For example, string theorists conjecture that there exists such a duality between black holes and elementary particles! I will discuss this example from string theory, and I will demonstrate some mathematical mirror symmetry involving polynomials and groups. I will explain various methods and formulas I obtained during my study of these objects. I will also explain some general observations on the dimensions of these mirror symmetry objects, based on computations I performed.

**Maggie Bristow (Major: Nursing)**
Field of Study: Pressure Ulcer Prevention

**Pressure Ulcer Prevention: A Study to Measure the Effects of Education on Pressure Ulcer Knowledge of Certified Nurses Assistants**

Pressure ulcers, also known as more commonly, “bed sores” result when a patient is sitting or laying in the same position for an extended period of time (Cutugno et al. 2015). They can occur most commonly in the elderly (Venes 2015). Pressure ulcers cost billions of dollars and result in embarrassment, anxiety, depression and an increased risk for mortality for the patient (Aljezawi, Al Qadire, and Tubiasht 2014 p.6). Certified Nurses’ Assistants (CNA) and Personal Care Assistants (PCA) are the primary caregivers in long-term care facilities to elderly patients.

This project seeks to assess the knowledge level of Certified Nurses’ Assistants (CNAs and Personal Care Assistants (PCAs) related to pressure ulcers and prevention technique and interventions by collecting data at two long-term care facilities (an assisted living facility and a nursing home) in Montana.

**• 2E: AVILA/DESMET ROOM**

**Jordan Trinka (Major: Mathematics)**
Field of Study: Mathematics and Fluid Dynamics

**Modeling Contaminant Flow in the Puget Sound Using the Finite Element Method**

In this presentation, we will mathematically model the transport of a contaminant in the Puget Sound using the finite element method. We will provide a derivation of the necessary differential equations as well the necessary background to understand the finite element method. We will conclude with animations showing how a contamination event occurs.

**Amy Mohr (Major: Nursing, Spanish)**
Field of Study: Psychiatric Nursing

**The Lived Experience of Chronic PTSD in Vietnam and Korean War Veterans: Implications for Nursing Practice**

Combat-related Posttraumatic Stress Disorder (PTSD) is a debilitating condition that affects between 18.7% and 30.9% of Vietnam veterans at some point in their lives. Current literature highlights the clinical relevance of PTSD, supporting the fact that it is a chronic, fluctuating condition with detrimental effects on mental and physical health. PTSD correlates with impaired cognition, concentration, problem solving, and reasoning along with increased likelihood of chronic illness, disability, unhealthy weight and pain. Clinical recognition of these symptoms in veterans over the age of 65 is imperative as they make up approximately 40.5% of the military demographic. Unfortunately, factors like stigma and skepticism
about evidence-based treatments for PTSD deter many patients from talking about their symptoms; complicating the identification of the disorder. Considering the prevalence of PTSD in Vietnam and Korean War veterans and the difficult nature of its identification, improved methods of assessment must be adopted in the healthcare setting. Recurrent PTSD needs to be addressed, not just by healthcare professionals in general, but by nurses in particular. Nurses spend extensive time building rapport and trust with patients; thus, nurses are often the best-suited caregivers to catch symptoms of PTSD. The aim of this study is to explore the experiences of chronic PTSD in aging veterans for the purpose of providing nursing-focused recommendations for establishing rapport, assessing symptoms and coping skills, and providing trauma-aware care for aging Vietnam and Korean War veterans struggling with combat-related PTSD.

Kavida Naidu (Major: Philosophy and Political Science)  
Field of Study: Rhetoric and Media Studies  
Beyoncé and Representation of Black Femininity in Mainstream Media

Black female artists have always struggled, and continue to do so, to obtain respect and leading positions in the entertainment industry. Magazines are aware of this power struggle and use it as a means to exploit the body of black female artists such as Beyoncé for profit-making purposes. In its May 2014 issue, Time magazine released its cover for the “The 100 Most Influential People.” Beyoncé was among the ones chosen to grace the magazine’s front cover. While Beyoncé’s image on Time’s cover is viewed as a significant progress for the black community because it is rare for a person of color, especially a black woman, to be nominated among “The 100 Most Influential People” in the world, critical viewers have argued otherwise. Beyoncé’s cover clearly echoes a blunt truth: hypersexualization of black women still dominates today’s mainstream media. This paper contextualizes the gender and racial politics of Beyoncé’s image on Time’s cover in relation to mainstream media representations of black female artists. It argues that Beyoncé’s image on Time is indicative of the hypersexualization and systematic denigration of black female artists in mainstream media. Given Beyoncé’ iconic status among young black female communities, this paper analyzes the fraught reception of Beyoncé’s image as a black female artist within the mainstream media and feminist communities. Finally, it contends that the mainstream media needs to be made more accountable for perpetuating hypersexualized images of black female celebrities because of their damaging implications for young women of color.
Session 3 Presentations, 3 to 3:45 p.m.

• 3A: FLEX THEATRE

Terry Cox (Major: Mathematics & Environmental Science)
Alex Ramm-Hutchinson (Major: Engineering Science: Mechanics)
Lizzy Younce (Major: Mathematics)
Joseph Zepeda (Major: Mathematics & Physics)
Field of Study: Mathematics

Math in the Mountains: Montana No Kid Hungry

We were approached by Montana No Kid Hungry, a statewide non-profit organization, to create analysis tools and analyze participation trends in their Alternative Breakfast Program that has been recently implemented through grants to schools across Montana. Our research encompassed the creation of an ADP (Average Daily Participation) analysis spreadsheet, pre- and post-grant data analysis per school over the past two school years, and a statistical analysis of the general trends of participation in granted schools. We found increases of meal participation for the majority of individual schools that implemented the Alternative Breakfast Program, however, we also saw a statistically significant increase of meal participation in data pooled from all of the schools which received grants.

Amy Mohr (Major: Nursing, Spanish)
Field of Study: Film Studies

Telephones, Transvestites and Theatrics: Performative Power and the Strength of Individual Identity in the Films of Pedro Almodóvar

The death of dictator Francisco Franco in 1975 left the Spanish people reeling, desperately searching for a new identity. They explored this identity and made a radical declaration of freedom through artistic self-expression. Pedro Almodóvar, one of the country’s first openly gay film directors, was among the brilliant leaders of this rebellious movement. In his work, Almodóvar challenged the Spanish people to question Fascist ideals, to think for themselves and to embrace the people marginalized under Franco. As his mode of expression, Almodóvar created campy, comedic characters who boldly and overtly questioned traditional ideals such as the subjugation of women, the acceptance of domestic violence and the idealization of gender as identity. In the words of French author Pietsie Feenstra, Almodóvar, “demarginalized the marginal identity by making it visible.” This project examines the metaphors used in three Almodóvarian films to criticize the performative nature of Francoist social ideals for gender and to celebrate the strength of individual identity in the face of marginalization.

Kaitlin Jones (Major: Sociology)
Field of Study: Sociology

Gym Stigma

This research project takes a closer look at whether or not people feel judged or “stigmatized” at a “gym” setting. In this research project it focuses on people’s opinions or feelings surrounding “gyms”. Data was collected through a survey. This research project examines the relationship between perceived stigma at gyms, perceived fitness at gyms, and gym attendance rates. Ultimately it examines whether there is stigma based on perceived appearance in gyms, and if there is, does this stigma affect the likelihood that people will use gyms because of fear of this perceived stigma?
Kelly Taft (Major: Political Science)
Field of Study: Political Science

**Populism in the 2016 General Election**

What role did populism play in the 2016 election? Generally, populism is used to describe a reactionary political movement that distrusts the political elite and existing institutions, and seeks to win power by using harsh rhetoric about conflicts between the “true people” and “the immoral elite.” In various ways, now-President Trump ran a populist campaign. But what about the voters? Did voters agree with President Trump’s claims that the vote count was rigged? How much faith did voters have in the political judgment of ordinary Americans? I answer these questions using data from an exit poll conducted by Carroll College students in Lewis and Clark County on November 8, 2016 (N=914). I found that Trump supporters on average had lower trust that their vote would be counted fairly than any other group. However, while Trump supporters tended to express little trust in the political judgment of the American people, the same was largely true of Clinton supporters. Based on these findings, I discuss whether this was indeed a populist election, and argue that academics should be more precise in how they define and apply the concept of populism.

Leah Henningsen (Major: Psychology)
Field of Study: Psychology

**Attaining Idealized Status: Motivation to Diet and Exercise After Exposure to Women with Ideal Body Types in Relationships**

We examined if exposure to idealized female images would impact women’s perceptions of themselves and also their likelihood of engaging in unhealthy behaviors. We used different images for conditions of idealized relationship status and body image. Participants completed this study in two parts. In the first part, they completed questionnaires to assess internalization of the idealized thin body image and feelings about the self. In the second part, participants were randomly assigned to one of four conditions. Participants saw a picture of a woman with or without an ideal body who was either with or without a male partner. After viewing one image, participants reported their desire to look like the model, feelings about themselves, and the length of time they felt motivated to exercise. Our results show that idealized images of women’s bodies influence behaviors and feelings of women who have internalized idealized media images and have weight concerns. Specifically, after viewing a thin model, women who have internalized the thin ideal and those who have concerns about their weight reported greater desire to look like the model, felt worse about their bodies, and reported that they wanted to exercise for longer. Being exposed to idealized images of women in relationships did not influence women’s motivation to engage in unhealthy behaviors or negative self-perception. These results add further support to previous research that demonstrates that media images impact how women feel about their bodies and can motivate women to engage in unhealthy behaviors to obtain idealized images.

Katherine Martineau (Major: Psychology & Anthrozoology)
Field of Study: Anthrozoology

**Behavioral and Physiological Stress in Pair-Housed Shelter Dogs**

A kennel is a high stress environment for a dog, this stress can cause the development of stereotypic behaviors which makes a dog less adoptable. The aim of this study was to measure the short term and long term effects of co-housing two dogs in a kennel in comparison to a single housed dog. Short-term assessment of stress was done by collecting urine for 7 days to measure cortisol, and in video snapshots of the kenneled dogs four times throughout the day. Stereotypies such as pacing, spinning, and barking as well as unwanted behaviors such as urination, bed chewing, and growling were noted. This study also focused on long term effects of co-housing dogs; length of stay on adoption floor was measured as well as return rate. After 7 days dogs were also retested on their dog-dog social skills to see if there was an improvement.
**Baird Linke (Major: Biology/Spanish)**
Field of Study: Spanish

**Hidden Voices: Latin American Women in Protest**

The 20th Century was a tumultuous time for Latin America. Dictators rose to power and two global superpowers vied for influence throughout the hemisphere. In the process of these changes, from the Cuban Revolution, to Pinochet’s coup in Chile, women’s voices were pushed to the margins. This work is an examination of the impact of revolution on the voices of women and how those voices were heard, as told by the women who lived through it.

**Hanna Roberts (Major: Psychology)**
Field of Study: Anthrozoology and Psychology

**Ponies Proliferate Positive Affect: The Effectiveness of Equine Therapy on Positive Affect in Adolescents with Serious Emotional Disturbances**

Adolescents with serious emotional disturbances (SED) are a particularly difficult population to treat due to high comorbidity rates of anxiety, depression, post-traumatic stress, and behavioral conduct disorders. The current study compared the effectiveness of equine-facilitated psychotherapy (EFP) and traditional group therapy (TGT) on measurements of positive affect (PA) and negative affect (NA) in SED adolescents. This study hypothesized that participants would have higher overall affect after EFP compared to TGT and that NA would be significantly lower after EFP compared to TGT. Participants (N=37) consisting of adolescents admitted in therapeutic youth group home treatment participated in EFP and TGT sessions once a week over an eight week period in addition to normative treatment. The Positive and Negative Affect Scale (PANAS) questionnaire was administered immediately before and after EFP and TGT sessions. Statistical analyses supported the hypothesis that participants would have higher overall affect after EFP but there were no significant differences between NA. Further analyses revealed that EFP was just as effective as TGT in increasing PA and decreasing NA. More importantly, participants had significantly higher PA before and after EFP compared to TGT. Even though PA scores improved in both therapies, participants arrived to and left EFP with significantly higher PA scores than TGT. Due to its unique effect on PA, EFP could be a more engaging and effective therapy for SED clients compared to hackneyed traditional therapeutic techniques.

**Jessica Lewis (Major: Secondary Education English Broadfield)**
Field of Study: English

**Better Call Becky with the Good Hair: African American Female Community Through Literature and Pop Culture**

“The most disrespected person in America is the black woman. The most unprotected person in America is the black woman. The most neglected person in America is the black woman” -Malcolm X. This research looks into Beyonce’s 2016 visual album Lemonade, the strong black community that surrounds it, and how this community gives women the respect, protection, and care Malcolm X saw as lacking. This specific community’s strength is not a new concept, which is seen through Zora Neale Hurston’s 1937 novel Their Eyes Were Watching God. Through the presentation, I will show how I analyzed the novel and movie by Hurston and Beyonce album to show how both the visual album and the novel stress the power in black female community, focusing on images of abuse and infidelity, the women’s hair, and phallic symbols. Through black female rejection of male power, this presentation will prove how women state their independence, which then strengthens the bonds between the members of these black female communities.
• 3D: RICE ROOM

Xavier Johnson (Major: Sociology)
Field of Study: Sociology
**The Effect of Canine Presence on Personal Information Sharing**

Dogs are often described as “social lubricants,” meaning that they create a common ground of conversation between strangers. Dog owners are often stereotyped in a positive manner and using status characteristics theory to examine this phenomenon would provide insight on the effects of this label (Berger, 1977). This research hypothesizes that those who come from labeled and positively stigmatized dog owning groups of America are more likely to be seen as possessing character traits perceived as “good.” Knowing the actual effect on perceptions that possessing a dog could have could be applied to a wide variety fields such as advertising or any other field where impressions are trying to be communicated through image. There could also be possible social benefits if others simply knew that another was a dog owner, would they treat this person any different?

Annelise Bayless (Major: Theatre)
Field of Study: Theatre
**Helping Marginalized Through Shakespeare Intervention: Why We Must Bring the Bard to the Societal Other**

When most people hear the name “Shakespeare,” they classify his work as intellective and relegate it to an advanced education taught by scholars. Far from that, images of autistic children eagerly playing Shakespeare games in a circle, or prisoners putting on a performance of The Tempest most likely do not come to mind. However, Shakespeare intervention has proven to be effective in reaching prisoners, people with mental disabilities, specifically autism, and people living in isolated communities to help them feel understood and included. This study explores what exactly it is in Shakespeare’s works that make such programs so compelling to those who, for all intents and purposes, are considered a societal “other.” This study focuses on Shakespeare intervention therapies through the Hunter Heartbeat Method; a set of games to help children manage the hurdles that come with having autism, Shakespeare in Shackles; a professor’s determination to reach “the worst of the worst” in super max prisons, and The Globe; a mission to bring Shakespeare to some of the most dangerous places on earth, among others.

Timothy Pays (Major: Civil Engineering)
Todd Pays (Major: Civil Engineering)
Field of Study: Civil Engineering
**Gold Creek Fishing Access Site**

For this project, we have worked with the Department of Fish, Wildlife and Parks alongside Professor Gary Fischer to design a fishing access site at Gold Creek just south of Drummond, Montana. The project includes a preliminary design report in which we gathered necessary data and information about the site and developed preliminary designs and alternatives. Once a preferred alternative was chosen, we developed a technical evaluation, design drawings and a construction bid package.
Field of Study: Accounting

**Integrated Reporting: Capital, Creation, Communication**

According to the International Integrated Reporting Council (IIRC), a coalition that includes accounting professionals and regulators, corporate operations affect the value creation of six types of capital (i.e., financial, human, manufactured, natural, intellectual, and social). Studies have shown that a positive relationship exists between financial performance and emphasis on environmental, social, and governance (ESG) issues (Bekefi & Epstein, 2016). Communicating meaningful reports that highlight the creation of the various types of capital is a challenge for companies. Traditional corporate reporting presents financial performance but does not widely respond to stakeholders’ demand for information related to ESG issues. This study used a case study approach to understand how companies are communicating capital value creation and ESG issues to stakeholders (i.e., GRI G4 reports, Integrated Reports, and SASB metrics in SEC 10-K report note 7 Management Discussion and Analysis). A purposeful sample of 10 companies recognized as leaders in ESG was used to analyze ESG reporting. Results of the study provides insight into best practices for ESG reporting.

Field of Study: Molecular Biology

**Affects of Metals and Metalloids on Tetrahymena thermophila**

In this experiment, we sought to answer the following question: do higher levels of metal exposure affect expression of the TThERM_0058490 gene in Tetrahymena thermophila? The TThERM_0058490 gene produces an ATP-binding cassette protein that is responsible for removing metals and metalloids from Tetrahymena thermophila. It is hypothesized that the expression of TThERM_0058490 will increase with exposure to metals. In order to test this hypothesis, Tetrahymena thermophila were randomly assigned to either a control group, which was cultured in a normal growth medium, or a treatment group, which—in addition to the medium—was exposed to water contaminated with metals and metalloids. Previous experiments have suggested that Tetrahymena thermophila growth is negatively affected by high metal concentrations. The experimental group was exposed to water mimicking chronic levels of metal pollution found in bodies of water in close proximity to mines. Low doses of contaminated water were given daily to the experimental group over the course of one week. Immediately following the culturing and exposure, RNA extraction, reverse transcription, and gene-specific PCR (including gel electrophoresis) was conducted on the samples from both the control and treatment groups. Because ATP-binding cassette proteins remove metals and metalloids, it was predicted that the TThERM_0058490 gene would
be up-regulated in organisms exposed to chronic levels of metal pollutants. It is also predicted that cell viability and cell growth rates will be lower for the treatment groups. This was measured using a live/dead cell viability assay and cell counting with a hemocytometer over a course of treatment period.

David Woolston (Major: Biochemistry/Molecular Biology)
Shelby Olson (Majors: Biology)
Field of Study: Molecular Biology

**An Assessment of the Level of Cwf16 Expression in Tetrahymena thermophila when Exposed to Ultraviolet Radiation**

The following research seeks to determine whether exposure to ultraviolet radiation will induce an increase in the expression of the Cwf16 gene in *Tetrahymena thermophila*. Cwf16 is a homolog to the gene Ccg94, whose gene product is a functioning member of the Prp19 complex, a protein complex which protects cells from committing apoptosis—programmed cell death—due to exposure to ionizing radiation. The homology between Cwf16 and Ccg94 yields the hypothesis that Cwf16 expression in *T. thermophila* will increase in response to UV radiation exposure in a similar mechanism to that observed the Ccg94 system. In the present research, *T. thermophila* cultures were randomly assigned into an experimental group and a negative control group, in which the experimental group was subject to incremental exposures to ultraviolet radiation over the course of one week. RT-PCR and gel electrophoresis were used to measure the level of expression of Cwf16, a LIVE/DEAD assay was to measure cell viability, and a hemocytometer was used to measure the growth rate of the control and experimental cultures. Despite the homology between the two genes Cwf16 and Ccgc94, we predict that UV-radiation exposure will not raise *T. thermophila*’s expression of the Cwf16 gene, because homology does not guarantee that the two genes’ products serve the same function. The Prp19 complex (the protein complex where we observe Ccdc94’s expression) has not been observed in *T. thermophila*, either because scientists have not looked for it, or because *T. thermophila* do not have the Prp19 complex in its biochemical repertoire.

David Woolston (Major: Biochemistry/Molecular Biology)
Field of Study: Biology

**A Genetic Analysis of Differentiation among Montana Culex tarsalis Populations Using Inter-Simple Sequence Repeats**

The present research comes courtesy of the Infectious Disease Ecology Project, a joint effort between Dr. Grant Hokit, Dr. Jennifer Glowienka, and Dr. Sam Alvey to develop a risk assessment model of West Nile virus progression through the state of Montana, and consequently predict when and where West Nile virus outbreaks will occur. This project features a genetic survey of Montana’s most common mosquito vector for West Nile virus, *Culex tarsalis*, to discern genetic differentiation between *C. tarsalis* populations across the state. PCR amplification of Inter-Simple Sequence Repeats (ISSRs), gel electrophoresis, and population genetic analysis methods were used to discern differentiation among *C. tarsalis* populations in eleven separate locations in Montana. This information can provide a measure of gene flow between populations and will provide another factor to incorporate into the West Nile virus risk assessment model for the state of Montana.

Alex Kurtz (Major: Biochemistry/Molecular Biology)
Kellea Nichols (Majors: Biochemistry/Molecular Biology)
Field of Study: Molecular Biology

**Does UV-A Exposure Affect Expression of the Rad-2 Gene in Tetrahymena thermophila?**

The Rad-2 protein is homologous to the XP-G protein in humans, which is involved in nucleotide excision repair of DNA. Because Rad-2 is a DNA repair protein, it can be linked to damage caused by UV radiation. Through exposing *Tetrahymena thermophilus* to realistic, daily UV-A dosages, it is expected that an
increased expression of the Rad-2 gene will occur. To test this, the *Tetrahymena* were assigned from a culture randomly to either a control or experimental, UV-exposed group. Following the experimental exposures, RNA extraction, reverse transcription, quantitative PCR and gel electrophoresis were used to quantify this change in gene expression. A live/dead cell imaging kit by Invitrogen was used to analyze and determine cell viability, and a hemocytometer was utilized to quantify cell growth over time. Due to Rad-2’s involvement in DNA repair, it is expected that it will be up-regulated following UV-exposure and its corresponding mRNA will be more prevalent compared to the control group in the post-experimental measurements. Following in this line, due to the DNA damage sustained during UV exposure, cell viability is expected to decrease along with overall culture growth rate.

Victoria Hill (Major: Biology)
Tamra Jones (Majors: Biology)
Field of Study: Neurobiology

**The Role of Ykt-6 in AMPA Receptor Function in *Caenorhabditis elegans***

AMPA receptors are transmembrane receptors for the neurotransmitter glutamate. These receptors are expressed in the postsynaptic dendrites of neurons and play a key role in regulating excitatory neurotransmission throughout the nervous system. More specifically, AMPA receptors are involved in the strengthening of rapid excitatory synaptic transmission which underlies higher order brain functions including learning and memory. Furthermore, the loss of AMPA receptors in the postsynaptic dendrite is thought to be an underlying cause of a diversity of psychiatric and neurological disorders. Due to their functional importance in the nervous system, AMPA receptors are widely studied in the field of Neuroscience. However, little is known about the role of proteins involved in the trafficking of these receptors to the dendrites of postsynaptic neurons. In this study, the link between AMPA receptor function and the putative AMPA receptor trafficking protein, Ykt-6, was examined in the model organisms, *Caenorhabditis elegans*. Ykt-6 has been shown to play an integral role in embryonic development and reproduction. To examine the link between Ykt-6 and AMPA receptor function, the messenger RNA for Ykt-6 was knocked down using RNAi. The *C. elegans* knockdowns were then subjected to behavioral assays, namely chemosensation and mechanosensation, which are known to be mediated by AMPA receptors.

Margaret Korus (Major: Biology)
Field of Study: Animal Physiology

**Physiological and Behavioral Responses of Laboratory Mice (*Mus musculus*) to the Odor of Predator Urine**

In order to evaluate the physiological responses of the common laboratory mouse (*Mus musculus*) to the odor of predator urine, metabolic rates were measured when mice were exposed to fox, bobcat and human urine. *Mus musculus* are derived from European mice and, therefore, may have evolved mechanisms to detect and avoid foxes; significant rodent predators throughout Europe. However, since bobcats are North American in origin, they represent predators to which M. musculus should not have evolved specific avoidance mechanisms. Humans are not predators of mice and were considered the control in these experiments. Metabolic rates were assessed by measuring oxygen consumption using a flow-through respiratory system. After a baseline rate was established, either 100 μl or 300 μl of urine was injected into the metabolic chamber and changes in metabolism were analyzed. Behavior was analyzed based on frequency of observed fear response and aversion behaviors. At the lower concentrations, the presence of fox urine elicited a significantly lower metabolic rate than the controls, while bobcat urine produced no significant change. At the higher concentrations, fox urine produced a significant increase in metabolic rate compared to the human control, while bobcat urine produced no significant change. The data suggests that low dosages provoke a freezing response while higher dosage stimulate a fear reaction. Behavioral analysis support this observation with a greater frequency of fear responses coinciding with higher metabolic rates.
Karen Hoffman (Major: Biology)
Field of Study: Biology (Human Development)

**Decreasing Atrial Septal Defects in Humans**

In the summer of 2015 I participated in the Cardiothoracic Surgical Skills Internship at Stanford University where I was challenged to find a minimally invasive way to treat atrial septal defects. An atrial septal defect is a congenital heart malformation in which a hole remains between the left and right atria of the heart, causing a mixture of oxygenated and deoxygenated blood. This is detrimental because the affected individual can experience severe hypoxia and sufficient levels of oxygen will not be delivered to tissues. Through literature research, interviews with surgeons and observations in the lab, I developed a theoretical approach to decrease atrial septal defects in humans. This technique uses gene therapy in utero by gene editing the patient’s cardiac cells and reinserting them, employing both procedures that are already being used in medicine today as well as procedures I developed. The pre-existing techniques include amniocentesis, genome mapping, gene editing and nanoparticle delivery. I developed the overall combination of procedures, determined the gestational age appropriate for the treatment, identified which specific genes to edit, proposed the addition of alpha-myosin to deactivate the HIV delivery system, determined the access points for insertion and proposed the use of MRI for cell placement. These methods are designed to work in tandem to prevent the defect from forming before birth.

Kaitlin Stromberg (Major: Biology)
Jakob Plagenz (Majors: Biochemistry/Molecular Biology)
Field of Study: Molecular Biology

**The Effect of Basic Conditions on CDK1 Expression in Tetrahymena thermophila**

The goal of this project was to discover whether the expression of the CDK1 gene in *Tetrahymena thermophila*, as well as their growth and viability, were affected by changing the pH of the growth media. We hypothesized that the expression of the CDK1 gene would decrease significantly when grown in basic media. The CDK1 gene encodes the protein Cyclin-Dependent Kinase, which functions to advance cells through various stages of the cell cycle. To test our hypothesis, *Tetrahymena* cultures were randomly assigned to either the control group, which was grown in media with a neutral pH, or a treatment group, which was grown in media with a basic pH of 8.5. Previous experiments showed that *Tetrahymena* were able to survive in pH levels up to 9.0, although their optimal survival was at a neutral pH. The control and experimental cultures were maintained for one week before being processed. Following the week-long incubation, RNA extraction, reverse transcription, and PCR were conducted on the control and experimental groups to determine the expression of CDK1. In order to look at growth rate and viability we used a hemocytometer to perform cell counts throughout the weeklong incubation and a LIVE/DEAD assay, respectively. Because CDKs are a major component of the cell cycle, we predicted that the expression of the CDK1 gene would decrease, and that both the cell viability and growth rate would also decrease, in *Tetrahymena* cells cultured in a basic environment.

Jack Rees (Major: Biology)
Keaton Brady (Majors: Biochemistry/Molecular Biology)
Field of Study: Molecular Biology

**Impacts of Environmental Motion on CDC2 Expression and Viability in Tetrahymena thermophila**

In this experiment, the effect of constant motion on expression of the cell cycle control gene CDC2 was examined in the organism *Tetrahymena thermophila*. We hypothesized that CDC2 expression would decrease with a corresponding increase in movement in the *Tetrahymena* culture environment. The CDC2 protein is primarily used in the replication of eukaryotic DNA because of its connection to HHO1, an important factor in transcriptional regulation. If the cells were subject to vegetative growth in which there are no stressors put on the cell, then HHO1 becomes phosphorylated to prevent it from interacting with...
chromatin. CDC2 is important in facilitating the phosphorylation of the HHO1, so in vegetative growth there would likely be an increase in the expression of CDC2. When the cell is subject to stressors there would be no need to control the growth by phosphorylating HHO1 so CDC2 expression would decrease. To address this hypothesis, *Tetrahymena thermophila* were randomly assigned to a control group, which was cultured under normal lab-growth conditions, or a treatment group, which was subjected to constant movement on an orbital shaker for a period of 24hrs. Following treatment, RNA extraction, reverse transcription, and gene-specific PCR (including gel electrophoresis) were used to analyze CDC2 expression in both the control and treatment groups. Furthermore, the growth rate of both groups was analyzed using a hemocytometer and cell viability was determined using a LIVE/DEAD fluorescence assay. We predicted that *Tetrahymena* cells subjected to constant motion would exhibit a decrease in cell viability, growth rate, and expression of CDC2.

Emma Esposito (Major: Biology)  
Natalie Oberding (Majors: Biology)  
Field of Study: Neurobiology

**Behavioral Effects of F07A5.4 Gene Knockdown in Caenorhabditis elegans**

Throughout the nervous system, AMPA receptors play a key role in regulating the amount of the excitatory neurotransmitter glutamate that a neuron can respond to. The expression of these AMPA receptors has been shown to play a key role in the processes of memory and learning in certain organisms. More specifically, high levels of AMPA receptors have been shown to increase the strength of a synapse while low levels have been shown to decrease synaptic strength. To date, there is little knowledge as to which proteins play key roles in the trafficking of AMPA receptors to the synapse. The goal of this experiment is to see whether the RNAi-induced knockdown of the gene F07A5.4, has an affect on AMPA receptor trafficking in the organism *Caenorhabditis elegans*. The protein encoded by the F07A5.4 gene is a homolog of the Olfactomedin 1 (Olfm1) protein in humans, which is abundantly expressed in the brain. The exact function of these proteins is unknown, but they are speculated to play an important role in nervous system function due to their high expression in nervous tissue. To address the role of F07A5.4 in AMPA receptor trafficking, the messenger RNA encoding this protein was knocked down in *C. elegans* through the use of RNAi expression vectors that were introduced into the *C. elegans* feeding bacteria. The *C. elegans* were then subjected to the AMPA receptor mediated behaviors of chemosensation and mechanosensation in order to determine the effect of the F07A5.4 knockdown. It was predicted that the knockdown of the F07A5.4 gene would decreases sensitivity to chemosensation and mechanosensation stimuli.

Emma Esposito (Major: Biology)  
Theda Knauth (Majors: Biochemistry/Molecular Biology)  
Amelia Ohnstad (Majors: Biochemistry/Molecular Biology)  
Field of Study: Molecular Biology

**Effect of EDTA on SIT1 Scramblase Gene Expression, Cell Viability, and Cell Growth in Tetrahymena thermophila**

Scramblase is an enzyme that facilitates the movement of newly synthesized phospholipids from the cytosolic side to the extracellular side of the lipid bilayer. This process is vital for cell membrane repair and growth. In *Tetrahymena thermophila*, the gene SIT1 Scramblase encodes for the Scramblase protein, whose functionality is Ca2+ dependent. In this experiment, the concentration of accessible Ca2+ ions was decreased in order to observe whether the change had an affect on the expression of SIT1, cell viability, and cell growth. It was hypothesized that expression of the SIT1 Scramblase gene would increase, while both cell viability and cell growth would decrease. *Tetrahymena thermophila* were randomly separated into either a control or experimental group. The control groups were exposed to conditions with no Ca2+ ligand, while the experimental groups were exposed to EthyleneDiamineTetraacetic Acid (EDTA). EDTA is a commonly used chelating agent that inhibits the function of calcium ions. After exposing the
experimental group to a single dose of EDTA over the course of one week, RNA extraction, reverse transcription, and gene-specific PCR were performed on both the experimental and control groups. Cell growth was also measured throughout the week of culturing by counting cells on a hemacytometer, and a LIVE/DEAD cell viability assay was performed at the end of the experiment. Because the addition of EDTA results in a deficiency of accessible Ca²⁺ ions, it was predicted that SIT1 gene expression would increase due to decreased productivity of available Scramblase proteins, and the cell growth and viability would decrease due to the inability to repair membranes.

Bryce Walker (Major: Biology)  
Sam Brunson (Majors: Biochemistry/Molecular Biology)  
Field of Study: Molecular Biology  
**CDC2 Expression, Cell Growth and Viability of Tetrahymena thermophila in Acidic Environments**  
This project examines how *Tetrahymena thermophila* responds to an environment with increased acidity. It was hypothesized that a decrease in environmental pH would result in lower expression of the CDC2 gene, a decrease in cell viability, and a decrease in the growth rate of *Tetrahymena*. CDC2 is the homolog of a major cell cycle regulation protein in humans called Cyclin-Dependent Kinase (CDK). CDK (and presumably CDC2) functions to phosphorylate proteins during the cell cycle, and it is an important structural component of ribosomes. To test this hypothesis, *Tetrahymena* cultures were maintained at either a pH of 7.0 to mimic natural freshwater environments as a control, or a pH of 5.0 to mimic an acidic environment, for the course of one week. Expression of the CDC2 gene was analyzed by semi-quantitative RT-PCR and visualized through gel electrophoresis. Rate of growth was assessed with a hemocytometer throughout the course of the treatment. Finally, cell viability was assessed using a fluorescent LIVE/DEAD assay. It was predicted that the expression of CDC2 would decrease in experimental cultures maintained in an acidic environment and that the viability and growth rate of the *Tetrahymena* would decrease as well.

John Bartlett (Major: Biology)  
Corbin Arbizzani (Major: Biology)  
Dylan Butorac (Major: Biology)  
Field of Study: Neurobiology  
**Effects of Y41E3.7 Gene Knockdown on AMPAR Transportation**  
α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptors (AMPARs) are important in the transmission of electrical signals between pre- and post-synaptic neurons. AMPARs are indicative of a stabilized and strong connection between neurons, and the number of receptors present at the synapse impacts the synaptic activity. Moreover, larger numbers of AMPARs are related to effective learning and memory formation, while fewer AMPARs have been shown to decrease learning effectiveness and impede memory formation. There is currently very little information regarding how these receptors are brought to the post-synaptic membrane of the dendrite from the cell body, where they are synthesized. For this study, we examined the phenotypic effects of Y41E3.7 gene knockdown in *Caenorhabditis elegans*, a model organism for neurological studies. The protein encoded for by Y41E3.7 is involved in Golgi apparatus activity, which manages proteins that are destined for export from the cell or insertion into a membrane. The experiments carried out in this study involved the expression cloning of Y41E3.7 into an RNAi expression vectors and analysis of RNAi-knockdowns on AMPAR-mediated behaviors, namely chemosensation and mechanosensation. We predicted that RNAi-induced knockdown of Y41E3.7 in *C. elegans* would result in their reduced response to mechanical and chemical stimuli.
Hannah Sylvester (Major: Biology/Health Sciences)  
Reegan DeBruycker (Major: Biology)  
Field of Study: Molecular Biology

**Effect of Nitrate Pollution on *Tetrahymena thermophila***

The question under investigation in this project was: "Does an elevated concentration of nitrates have a negative effect on the growth, viability, and expression of *CDC16* in the organism *Tetrahymena thermophila*?" Exposure of *Tetrahymena* cultures to nitrates mimics the exposure of these organisms to nitrate pollution in the environment, which can occur due to septic tank leakage, nitrogen-rich fertilizer run off, and agricultural processes. The EPA standard for nitrate concentrations in drinking water is a maximum of 10ppm. In our experiment, *Tetrahymena* cultures were treated with media that contained 30ppm of nitrates for one week. The 30ppm nitrate concentration has been proven acceptable for freshwater fish, therefore we predicted that it would have more of an impact on our *Tetrahymena* cells which are far less complex. The *CDC16* gene encodes a Cell Division Cycle protein that contains an anaphase-promoting complex (APC). This APC is involved in Cyclin degradation and promotes the movement of the cell out of mitosis. Following a one-week exposure to 30ppm nitrates, the growth rate of *Tetrahymena* cultures was determined using a hemocytometer and cell viability was analyzed using a fluorescent LIVE/DEAD viability assay. Furthermore, expression of the *CDC16* gene was analyzed using semi-quantitative RT-PCR. We predicted that a high concentration of nitrates would decrease the growth rate, viability, and expression of *CDC16* in our *Tetrahymena* cultures.

Victoria Kong (Major: Chemistry)  
Field of Study: Chemistry

**Undergraduate Chemical Education: The Nernst Equation**

General chemistry classes often approach electrochemistry concepts with a textbook teaching approach, making use of visualizations during lectures. While this may be a beneficial way to understand many chemistry concepts, students would do well to approach electrochemistry with a more practical and hands-on approach. In this lab, two things were achieved: a galvanic cell was made from mixed metal components, allowing students to determine the identity of an unknown metal, and the value of the Nernst constant was calculated through experimental data from a concentration cell. A galvanic cell with 1.5M copper nitrate solution at the cathode and a 1.5M zinc nitrate solution at the anode was made. A copper wire was used for both electrodes. A measured electrochemical cell potential for this system was found to be -0.61V, giving a -19.7% error when compared against the theoretical Ecell value of -0.76V. The theoretical Ecell value was calculated using the equation Ecell= Eanode- Ecathode. Using this technique, a galvanic cell using 1.5M copper nitrate aqueous solution and 1.5M lead nitrate aqueous was also made, resulting in a -7.69% error when compared against the theoretical. Using a concentration cell with a copper nitrate solution at the anode and cathode, the value of the Nernst constant was calculated to be 0.0455, generating a 35% error when compared against the theoretical Nernst constant value of 0.0297.

Shae Hess (Major: Chemistry)  
Field of Study: Chemistry

**Visible Light Oxidative Dimerization TCV-2T**

2-[2,2′ bithiophene]-5-yl-1,1,2 ethenetricarbonitrile (TCV-2T) from bithiophene and tetracyanoethene was characterized by UV-Vis, cyclic voltammetry multidimensional NMR. The H1NMR contained two easily distinguishable doublets, two overlaid doublets, and one triplet peak consistent with the expected spectra for TCV-2T. The doublets, for the proton at the 5 position, were observed downfield of the 6 range of the starting material due to the electron withdrawing nature of the cyano group on the TCV-2T. The UV-Vis had a λmax at 500 nm, which is consistent with literature values. The cyclic voltammogram of TCV-2T displays an irreversible oxidation consistent with forming a new compound and the literature strongly
suggests that oxidation will form at the alpha hydrogen creating a dimer. Chemical and electrochemical synthesis of 1,1,2-ethenetricarbonitrile,2,2’-[2,2’:5’,2”:5”,2”’-quaterthiophene]-5,5”’-diylbis (TCV-2T dimer) will be discussed as will possible applications for TCY-2T in using sunlight to synthesize solar fuels.

Samuel Carroll (Major: Chemistry)
Field of Study: Chemistry
**Retrosynthesis of 2-iodo-aryl-indole Via Cyclization**
Retrosynthetic analysis is a practice commonly used to engineer a synthetic pathway for large useful molecules such as pharmaceuticals. In this process, a synthesis is broken down into smaller steps in order to construct the target molecule from readily available and inexpensive starting materials. A series of retrosynthetic steps were proposed to produce in high yield a heterocyclic molecule, 2-aryl-indole, which is useful as a precursor for several pharmaceutical drugs. The molecule will be formed using two Sonagashira coupling reactions and a carbopalladation/cyclization reaction. Thus far, the first Sonagashira coupling has been successfully completed, forming 2-[[trimethylsilyl]-ethynyl]-anisole with 80% purity. This compound has been characterized using 1H NMR and GC-MS.

Nicole Seehafer (Major: Chemistry)
Field of Study: Chemistry
**Synthesis and Kinetics of Chromium (II) Dimers For Solar Panels**
The synthesis of a Chromium (II) Dimer with acetate ligands or with α,α,α^’,α^’-tetramethyl-1,3-dipropionic acid (TBP) ligands were achieved by introducing the Cr3+ to mossy zinc and concentrated HCl under O2 free conditions, resulting in the reduction of the chromium to Cr2+. Once the chromium was reduced, the ions were exposed to deprotonated acetate or TBP ligands. The H1NMR and UV-Vis spectrum of the chromium (II) dimers were collected. The spectra indicate that the Cr3+ has an absorption maximum of approximately 580nm, whereas the Cr2+ had one at approximately 325nm. Analysis of the reaction kinetics for the oxidation of the chromium dimers was performed with the use of the UV-Vis as molecular oxygen was bubbled throughout the air free solution of methanol and the dimer. The NMR spectra and kinetics of the chromium (II) TBP dimer will also be discussed.

Monika Weber (Major: Chemistry)
Field of Study: Chemistry
**The Synthesis, Characterization, and Ligand Exchange of Cadmium-Selenide Quantum Dots**
Herein the synthesis of Cadmium-Selenide quantum dots is reported. Two different procedures were carried out in an attempt to synthesize more highly fluorescent quantum dots. One procedure yielded a series of 1 mL quantum dots which reported lambda values at 550 nm and greater. These quantum dots varied in size, but were extracted within a seven minute time frame. The other procedure was conducted in hopes of synthesizing quantum dots which would fluoresce at a more blue-shifted lambda value, suggesting a higher fluorescence efficiency. These quantum dots are expected to be water soluble, which would enable their possible use as fluorescent tags for cancer cells or conductors in solar cells. The absorption and PLI spectra were collected for both groups of quantum dots for classification and characterization purposes.
Lauren Palys (Major: Chemistry)
Field of Study: Chemistry

**Synthesis of Blue Light Emitting Molecules with Applications in OLED Technology**

Organic light emitting diodes (OLEDs) have many applications in modern technology including smartphones, tablets, and even in NASA’s cockpit displays. One benefit of an OLED display is its potential flexibility; meaning these displays can be curved or bent depending on the intended purpose. In order to generate a complete color display, red, green, and blue light emitting molecules are required. Red and green light emitting molecules have been successfully synthesized with relatively long lifetimes and stabilities. However, thus far, synthesis of long lasting and stable blue light emitting molecules has proven difficult. A family of novel organic molecules designed to emit blue light are currently being synthesized and characterized for potential applications in OLEDs. The parent molecule is composed of three subunits: a Dendron (green), a carbazole center (red), and a conjugated biphenyl unit (blue), which will be coupled together to create the molecule of interest. All subunits of the parent molecule have been synthesized. Preparation for coupling is underway as the conjugated biphenyl unit is borylated. The subunits will then be joined using a Suzuki coupling reaction. Upon synthesis and characterization of the parent molecule, photo emissive properties and durability under oxidative conditions will be studied. Derivatives will then be synthesized to construct a family of novel molecules and variations in wavelength of emission as well as stability to air and heat degradation will be studied.

Kelby Depner (Major: Chemistry)
Field of Study: Chemistry

**Arsenic Concentrations in Helena Area Soil and Lake Helena Core Samples**

Arsenic concentrations from both Helena area soil samples and Lake Helena core samples were quantified using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). Results from this study will be used to investigate geographical hypotheses, including the correlation between Arsenic concentration and flooding events in the Helena Valley. Samples were digested in Nitric acid to remove all organic material and were analyzed for the metalloid Arsenic. Due to inconsistencies in both the ICP-AES plasma and matrices of the samples, a Gold internal standard method was implemented. Using the instrument’s response factor between Arsenic and Gold’s emission spectra, the unknown concentration of Arsenic in the samples was able to be quantified consistently. Upon initial investigation, it was found that the soil from Lower Tenmile Creek was the only soil sample that had an appreciable concentration of Arsenic (3500 ppm), which is well above the EPA standard (.39 ppm).

Joel Kramer (Major: Chemistry)
Field of Study: Chemistry

**Stereoselectivity of a Ruthenium-Arene Complexed Dienophile in a Diels-Alder Reaction**

Previous studies have shown that reaction rates are accelerated for a Diels-Alder (DA) reaction of a dienophile containing a η6-ruthenium arene complex compared to similar dienophiles without this moiety due to the electron-withdrawing nature of the former. In this study, we intend to investigate the stereoselectivity of the ruthenium-arene DA reaction using ethyl trans-2-chlorocinnamate as the base dienophile-(uncomplexed form). To pursue this goal, Ethyl trans-2-chlorocinnamate has been synthesized via a Wittig reaction of 2-chlorobenzaldehyde and Ethyl(triphenylphosphorylanylidene)acetate in 22.7% yield after running 2 rounds of column chromatography. 1H-NMR studies indicate that the ruthenium-arene dienophile has been prepared. Current efforts are being directed at fully characterizing the test ruthenium-arene dienophile and investigating its stereoselectivity in the DA reaction through 1H-NMR and X-ray studies. It is proposed that using the ruthenium-arene dienophile will influence the stereoselectivity as compared to the base dienophile.
Gunnar Hilborn (Major: Chemistry)
Field of Study: Chemistry

Study of Solid-State Solventless Reaction Rates

In the chemical synthesis of compounds, almost all reactions take place within some form of solvent. Solvents allow for uniform mixing of reagents to allow a reaction to take place, but can be harmful and costly to use in large quantities due to environmental regulations and safety concerns. In this research project, a reaction was run in typical solvent conditions as well as with a solventless method. Products were characterized by GC-MS, IR and 1H NMR spectroscopy and analyzed to determine product structure, yield, and purity. Reactions of 1,6-hexanediimine with multiple oxidizing reagents were conducted at different temperatures, to explore the rate of the reaction in both solventless and traditional solvent based reaction conditions. Characterization and quantification of products has proved to be challenging at this juncture. Future directions will include the study of alternate systems. The findings of this project could provide insight into solventless reactions of a similar kind, allowing for more cost effective methods of synthesis and more environmentally friendly chemistry.

Emma Patello (Major: Chemistry)
Field of Study: Chemistry

Investigations into Inexpensive Methods for Stereoselective Ruthenium-Arene Complexation

Planar chiral Ruthenium-arene complexes are highly valued in organic synthesis. However, an inexpensive method for making these compounds stereoselectively is currently not available. In literature, there have been reports of methods to synthesize inexpensive Ruthenium-arene compounds, but these reports did not demonstrate a stereoselective synthesis of aplanar chiral ruthenium-arene complexes. It is the goal of this project to compare the stereoselectivity synthesis of these complexes using both inexpensive and expensive ruthenium sources. Preliminary 1H NMR studies suggest the chiral ruthenium-arene complexes are being formed stereoselectively using the inexpensive methods. Isolation and characterization of these complexes are ongoing.

Anne Morse (Major: Chemistry)
Field of Study: Chemistry

Cyanine Dyes Oxidative Dimerization

In the current study homologs of 1,3,3-trimethyl-2-[2-(2-thienyl)ethenyl]3H-Indolium iodide (designated as n=1) were synthesized to test their performance in a thiophene dimerization reaction. 2-Thiophenecarboxaldehyde was reacted with 1,2,3,3-Tetramethyl-3H-indolium iodide to create the n=1 substrate, with a high reaction yield. The n=1 indolium-thiophene complex was not dimerized reproducibly. The synthesis of the n=2 complex was completed by first reacting 2-thiophenecarboxaldehyde with acetaldehyde to make 2-thiopheneacrolein, which was collected in moderate yield and as a mixture of cis and trans isomers, then reacted with 1,2,3,3-Tetramethyl-3H-indolium iodide to synthesize 1,3,3-trimethyl-2-[2-(2-thienyl)butadienyl]3H-Indolium iodide (1:1). Unlike the n=1 compound, the n=2 structure was successfully dimerized and characterized by electrochemistry. This dimer was also isolated as a mixture of the cis and trans isomers.

Isabelle Gray (Major: Chemistry)
Field of Study: Chemistry

The Moscow Mule: Investigation of Copper Leeching in a Popular Beverage

The Moscow Mule is an alcoholic cocktail that consists of ginger beer, vodka, and lime, over ice. This drink is most commonly served in a copper mug and questions have been asked about potential copper leeching from the mug into the Moscow Mule. To study this question, Inductively Coupled Plasma-Atomic
Emission Spectroscopy (ICP-AES) was used to measure Moscow Mule samples for the concentration of copper as a function of time. After finding that copper does leech into a standardized Moscow Mule a reductionist method was used to isolate each component of the drink and identify its contribution to copper leaching. Through this method both the ginger beer and the lime showed an increase of copper concentration over time, leading to the hypothesis that leaching is pH dependent. To test this theory multiple samples of a hydrochloric acid solution at different pH levels were prepared and analyzed. The results showed that the more acidic the solution, the higher the concentration of copper. Through these experiments, it was found that the concentration of copper that leeches into a Moscow Mule solution (pH=2.7) exceeds EPA limits (1.3 mg/L) within 20 minutes.

**Allison Bayer (Major: Environmental Science)**
**Layne Ryerson (Major: Environmental Science)**
Field of Study: Environmental Science

**Coal Dust Mobilization and Deposition from Coal Trains Near Helena, MT**

Approximately 4 to 5 coal trains pass through the Helena area each day, bringing coal from eastern Montana to Seattle. It is known that coal particles are lost during open car transport even though surfactants are added. Preliminary studies by BNSF have shown up to 600 lbs of coal can be lost per trip. Students in the ES 304 Field Methods course class designed a research project to 1) determine the amount of coal dust deposited around railroad tracks in the Helena area, and 2) evaluate factors that may influence the mobilization and distribution of coal particles from trains (particle size, wind direction, speed). It was reasoned that seasonal snowpack functions as a capturing mechanism for windblown coal dust, and that quantification of coal dust particles per unit area would provide an easy preliminary assessment of the distribution of coal dust near tracks. Sites were selected to test external factors such as dominant wind direction. Snow samples were collected with 2-gallon plastic buckets inserted vertically from snow surface to ground level at measured 5m intervals along transects oriented perpendicular to tracks. The snow-water equivalent and particle concentrations were analyzed in each sample. Distribution maps and graphs showing coal dust distribution at different sampling locations indicate that wind exposure and wind direction is an important factor. Results of this study can be used to estimate what might happen if the number of coals trains were increased, and if that may pose a risk to local residents who live near the tracks.

**Joseph Ikehara (Major: Computer Science)**
**Sophia Rodrigues (Major: Elementary Education)**
Field of Study: Discrete Mathematics

**The Combinatorics of Liar's Dice**

In this research we investigate probabilities and potential strategies with the dice game, “Liar’s Dice”. We explore the combinatorics, or the mathematics of counting, to answer questions like “how many possible ways can we play this game” or “which outcomes happen the least/most” as well as winning strategies.

**Chloe Hendrickson (Majors: English Literature and English Writing)**
Field of Study: English Literature and Classical Studies

**The Mad Woman in Medea: An Intersectional Feminist Analysis of Medea and Contemporary Revisions**

My honors thesis project focuses on Medea, the classical Greek play by Euripides that was first produced in 431 B.C., and its feminist, queer, and postcolonial revisions in contemporary global contexts. These revisions include *The Hungry Woman: A Mexican Medea* by Chicana queer feminist author Cherríe Moraga and *Black Medea* by Indigenous Australian playwright Wesley Enoch. Common to all of these primary texts are the themes of Medea’s madness and anger, which are tied to the fraught questions of the home, nation, and the Other. Each section of my thesis focuses on a different play, analyzing the intersectional
feminist politics of Medea’s madness across varying sociopolitical and historical contexts. While all the individual sections of my thesis develop a nuanced argument specific to the sociopolitical context of the play, the guiding theme throughout my thesis is that readers must interpret Medea’s madness through an intersectional feminist lens. Each section begins by situating the play within its specific historical context by identifying the colonial and feminist backgrounds of the author’s geopolitical location and ends by interpreting Medea’s madness within that context. Ultimately, I argue in my analysis of each play that the function of Medea’s madness is determined by her marginal locations as a woman and an exiled Other within the domestic space and the nation-space; reading the source text and the revisions through an intersectional feminist framework allows the reader to see how Medea must navigate “home” as simultaneously gendered and racialized spaces, as both spatial and discursive constructs.

Kristina Mills (Major: Environmental Science)
Bailey List (Major: Environmental Science)
Field of Study: Environmental Science

**Sediment and Heavy Metal Transport During Flood Events in Lake Helena**

Lake Helena formed around 1910 with the construction of Hauser Dam on the Missouri River. The lake is fed by Tenmile and Prickly Pear Creeks, each impacted by historical mining activity and designated EPA Superfund sites. Lake Helena is considered an impaired water body and a 2015 restoration plan identified sediment, nutrients, metals, and temperature major impairments to the lake. In 2011 a 30-year flood significantly impacted the watershed. Satellite imagery shows that the Tenmile / Prickly Pear delta at the west end of the lake advanced 40-80 meters, depositing approximately 1.97 hectares of new sediment at the surface in a single event. It is presumed a sediment pulse would extend across the lake. An even larger flood was recorded in 1981. The ES 304 Field Methods class designed a research project to 1) estimate the the extent and volume of flood induced sediment pulses, and 2) determine if flood sediments also contain heavy metals previously ‘stored’ along the stream channels feeding the lake. A series of sediment cores was obtained along a transect extending from the delta toward lake outlet. Sediment layers were analyzed for change in particle size and content, organic content, and heavy metals. The extent of flood transported sediment, estimated volume of sediment, and the potential threat of flood-induced metal contamination to the lake will be determined. The results of this study will help inform restoration plans for Lake Helena by assessing potential impact of floods and the influence of lake bottom sediments on water quality.

Fallon Machado (Major: Health and Physical Education)
Field of Study: Education and Theology

**It Takes Three**

The primary focus of my poster is the interconnection of body, mind, and spirit. In the world of education, we often focus on intellectual/mental health or even at times physical health, but have failed to recognize and strengthen a student’s spiritual health. Through this presentation, I demonstrate that health should not be compartmentalize into three distinct categories (physical, spiritual, and mental), but rather acknowledge that the categories are inextricably interconnected. Only by acknowledging these influential connections, can teachers truly uphold a student’s holistic well-being. Through this poster, I not only display this connection, but describe what a healthy spirit looks like in a school system that often negates it.

Madison O’Dell (Major: Health Sciences)
Field of Study: Health Sciences

**Mechanical vs. Manual CPR in Out-of-Hospital Cardiac Arrests**

Objective. This systematic review was conducted to see if the current research had a definitive answer to whether manual or mechanical CPR had better survival outcomes.
Methods. This systematic review was conducted between September and October 2016 and included all relevant peer reviewed articles. Articles were collected from PubMed and CINAHL and were included in the study based on if they had relevant information on survival outcomes for manual and mechanical CPR in out-of-hospital situations.

Results. Three articles agreed in that mechanical CPR improved survival outcomes, while three other articles stated that there was no difference between manual and mechanical CPR, one article stated that mechanical CPR actually worsened patient outcomes.

Conclusions. The overall conclusion of this systematic review is there needs to be more research conducted on the topic. Based on the current data collected, there is no single conclusion drawn from this study at this time.

Keywords. out-of-hospital cardiac arrest, cardiopulmonary resuscitation, mechanical, thorax OR chest compression, manual CPR OR mechanical device CPR, and Lucas Device.

Cassidy Hammons (Major: Health Sciences)
Field of Study: Physical Therapy
**Dry Needling in the Treatment of Chronic Myofascial Neck Pain: A Systematic Review**

Objective: review relevant literature to determine if dry needling is an effective treatment for chronic myofascial neck pain.

Methods: databases such as PubMed and CINAHL were searched for articles pertaining to dry needling and neck pain.

Results: dry needling was found to have a positive effect on neck pain. Both dry needling and manual therapy was successful in decreasing pain, especially in patients with myofascial pain syndrome.

Discussion: dry needling can decrease hours of pain per day and pain intensity. Therefore, acupuncture should be coupled with stretching for the most effective treatment of myofascial neck pain.

Mariah Schell (Major: Health Sciences/Biology)
Field of Study: Public Health/Exercise Science
**Effect of Volleyball Playing Surface on Joint Health**

The sport of volleyball is becoming increasingly popular, with over 46 million American’s participating each year. At the competitive level, injuries are likely to occur and most commonly these are of the ankle and knee. There are many factors that may contribute to an athlete’s risk for joint injury such as gender, training load and previous trauma. However, this research examines whether playing surface, in this case sand or hardwood, has any effect on a player’s likelihood of injury due to the increased impact on their joints. Contributing factors and possible prevention techniques will also be discussed, in hopes to help coaches and players alike prevent and properly rehabilitate joint damage sustained while playing volleyball.

Deaundra Shackelford (Major: Health Sciences/Theatre)
Field of Study: Health Sciences/Theatre
**Simulated Patients: The Actor’s Perspective**

Simulated Patients are actors who depict patients or patient family members in a health care professional training area by simulating ‘real-life’ scenarios, including medical history and physical symptoms. Simulated Patients(SP’s) are becoming increasingly more common in medical training programs to help assist medical students in bridging the gap between patient and practitioner. The benefits of SP’s on
medical students has been well documented and thoroughly researched, yet the benefits for actors needs more consideration. In an effort to study the possible effects of SP work on actors, the researcher conducted a thorough literature review and then visited University of Hawaii’s HealthCAST in order to participate, observe, and survey actor’s currently in the program. This poster reveals the findings of this research and begins to educate the general population about the benefits of SP work on actors.

Callie Morris (Major: Health Sciences)
Field of Study: Veteran Health

The Effects of Therapy on the Quality of Life in Veteran Amputees

Research for this poster presentation was conducted using peer-reviewed articles concerning the quality of life in veteran amputees through a therapeutic intervention. The research strived to compare whether or not therapy had a relationship with the outcome of quality of life. Articles were gathered from PubMed and CINAHL and assessed by the relevancy they had to whether or not quality of life was improved in veteran amputees with therapy. Therapeutic measures, such as medications or prosthetics, were shown to have a positive relationship between veteran amputees and quality of life. Specifically, prosthetics improved the social, mental, emotional, and physical well being of the amputee, although in one study a positive relationship between therapy and quality of life in veteran amputees was not shown. For veteran amputees, physical therapy and mental therapies are associated with improvements in quality of life, however more research needs to be done concerning interventions for the quality of life in veterans.

Terry Cox (Majors: Mathematics & Environmental Science)
Dylan Allen (Major: Mathematics)
Nathan Boone (Major: Mathematics)
Field of Study: Mathematics

Airport Security: A More Efficient System

Unfortunately, we are all too familiar with the hassles of getting through a TSA airport security zone. Over the recent years, TSA has become especially notorious for their long waiting lines and unpredictable variance with processing speeds. We have created two modeling systems that simulate the flow of passengers through a TSA security zone. While utilizing provided data from the Mathematical Competition of Modeling, we constructed models and incorporated these flow rates into our models. These models were successful in simulating the flow of passengers and identifying bottlenecks and problem areas. Our models provide recommendations to TSA management based off our findings. These recommendations are aimed at improving processing speeds, assigning agents to the most effective zones and roles, and modifying some of their regulatory systems. A sensitivity analysis of our parameters and flow rates was conducted to account for the unpredictable nature of this problem.

Marcellus Randall (Majors: Mathematics and Chemistry)
Field of Study: Discrete Mathematics

Combinatorics of a Changing Card Game

This poster presentation covers how discrete mathematics can be applied to counting problems such as those found in board games. Counting techniques such as combinations and permutations are applied to the card game Flux to count how many possible playing field setups can be created with a deck of Flux cards. Mathematical techniques are explained throughout the process to help the audience understand basic and complex counting methods, and to show how discrete mathematics can be applied to something interesting and fun, like a board game.
Vegetarian Diet and Its Effects on Serum Lipid Levels

Cardiovascular disease is a serious public health problem, especially in populations 65 and older. Coronary artery disease, in particular, is the number one cause of morbidity and mortality in the United States (Dourado, de Arruda C’amara e Siqueira Campos, & Sakugava Shinohara, 2011). Lifestyle changes, such as a vegetarian diet, have been shown to reduce the risk of cardiovascular disease by lowering serum cholesterol levels. A vegetarian diet includes consuming plant-based products such as fruits, vegetables, legumes, grains seeds & nuts, but in some cases may also include animal-based products such as eggs and dairy. Some studies conducted on individuals consuming a plant-based diet have revealed a 24% decrease in heart disease (Dourado, et al., 2011). This Evidence-Based Practice Brief seeks to answer whether a vegetarian diet has a positive effect on cardiovascular health, and thus, could be recommended as a nursing intervention for patients with high cholesterol levels.

The Use of Opioid and Alternative Therapies for Chronic Pain

Currently, the United States is experiencing an epidemic of opioid related addictions and deaths. Modern studies suggest that “20 percent to 30 percent of opioid analgesic drugs prescribed for chronic pain are misused, while the rate of opioid addiction is approximately 10 percent” (“Rate of opioid misuse,” 2015, p.7). Opioid drug abuse is defined as using the drug not as prescribed and with little to no regard of the consequences of the abuse (“Rate of opioid misuse,” 2015, p.7). The possibility for the concurrent use of alternative therapies alongside opioid use for pain management may be a method of lessening narcotic dependence. Alternative therapies such as acupuncture, meditation, and imagery could be used to supplement the analgesic effects of opioids in an attempt to promote alternative methods of pain management and reduce the event of dependence. The purpose of this Evidence Based Practice Brief is to examine the rates of addiction between chronic pain patients who are only using opioid therapy versus those who use a combination of opioid therapy and alternative therapies. Nurses will be able to use this information to help create optimum care for patients dealing with chronic pain patients and help to lower the risk of drug misuse or addiction.

Iron Deficiencies Related to Depression in Women of Childbearing Age

In women of childbearing age (women between menarche and menopause, approximately 12-49 years old), iron deficiency is a common problem, with 16% of US women age 12-49 lacking sufficient iron reserves according to Centers for Disease Control (CDC) data (2013). Iron deficiency can cause symptoms including fatigue, weight loss, dizziness, weakness, inability to concentrate, difficulty breathing on exertion, rapid breathing, palpitations, and sensitivity to cold related to the chronic low oxygenation it causes (Nursing Central, 2017). Symptoms of depression can include irritability, persistent fatigue, inability to concentrate, changes in body weight, and insomnia or excessive sleep (Nursing Central, 2017). As noted by the CDC, 1 in 10 women between the ages of 18-44 experienced symptoms of major depression in the past year (CDC, 2016). Several of the symptoms of iron deficiency and depression overlap, which could possibly indicate a potential relationship. The purpose of this Evidence-based Practice Brief is to investigate the potential relationship between iron deficiency and depression in
Yoga as an Alternative Therapy for Depression

In the past several years, depression has become a prevalent illness in the United States. “In 2015, an estimated 16.1 million adults aged 18 or older in the United States had at least one major depressive episode in the past year. This number represented 6.7% of all U.S. adults” (NIH, 2015). According to the National Institute of Mental Health, depression is a mental disorder that can cause serious symptoms that make daily activities, work, sleep, and recreational activities difficult. To be diagnosed with depression, an individual must have several symptoms for two weeks or longer (2016). While there are currently several pharmacological treatments for depression, in recent years the use of alternative therapies to treat depression have become more popular. The purpose of this Evidence Based Practice Brief is to review the current literature about patients in the United States with depression to see how a weekly yoga practice affects patient-reported mood compared to traditional pharmacological treatments. If a weekly yoga practice is found to have a positive impact on depression, these findings will help nurses recommend yoga as a nonpharmacological intervention for depression, either independently or in conjunction with traditional pharmacological methods.

An Extension of the Nurse's Hands: The Prevalence of Bacteria on Healthcare Providers' Stethoscopes

Hospitals are viewed as a clean and sterile environment. However, what if one of the most commonly used tools in a hospital carried the most infectious agents? This project will explore the relationship between the transmission of bacteria from stethoscopes to patients. According to the Mayo Clinic, there is “strong evidence of the potential for stethoscope-mediated transmission of microorganisms and the need to systematically disinfect stethoscopes after each use” (Longtin et al., 2014, p. 299). The purpose of this Evidence Based Practice Brief is to determine the effectiveness of cleaning one's stethoscope between each patient to prevent disease. The findings from this project will be used by all nurses in their clinical practice, as this research will help us understand whether or not it is best practice to clean one's stethoscope in between each patient use. The information from this project will be used during the assessment phase of the nursing process.

Motivational Interviewing and Exercise

Obesity is on the rise, and it is becoming a more prominent issue in adolescents in our society. “Obesity is defined as a [body mass index] BMI at or above the 95th percentile for children and teens of the same age and sex” (Centers for Disease Control and Prevention, 2015). Nurses and healthcare professionals see it first hand, as well as the dangerous effects that it has on adolescents later in life, if left untreated.
For example, diabetes, hypertension, cardiovascular diseases, and poor self esteem are all possible negative outcomes of obesity and inactivity. This Evidence-Based Practice Brief will explore motivational interviewing and encouraging adolescents to not only engage in physical activity but to want to change their sedentary lifestyle into a more active one that will continue throughout their life. More specifically, the following question will be addressed: in teenagers ages 15-17 years old, how does motivational interviewing compared to non-motivational interviewing affect their engagement in light to moderate physical activity? This information will help nurses motivate their patients to be more physically active and live a healthier lifestyle. Nurses are often the ones who build trust and rapport with patients and may intervene and begin teaching about physical exercise to this age group. This is an ongoing process for patients, which means that motivational interviewing, as a means to motivate adolescents to be more active, is incorporated into the planning and implementation phases of the nursing process.

Jessica Aguirre (Major: Nursing)
Kaylee Main (Major: Nursing)
Field of Study: Nursing

How Do College Students in the United States Perceive the Influenza Vaccine?

Controversy around the influenza vaccine has been a factor for many college students. It is estimated that only ten percent of college students receive the flu vaccination each year (Donovan, 2012). Many factors contribute to the controversy such as believing they are at low risk for contracting the virus, curiosity of the effectiveness of the vaccination, and questioning if the vaccine itself will harm and/or weaken the immune system. Ramsey and Marczinski (2011) believe “The motivation for flu vaccine refusal of a novel flu vaccine is fear of side effects” (p. 2). College campuses are at a heightened risk of a pandemic of influenza due to large populations and close proximity of students to one another. In a recent study, only 15% of participants reported they would receive the vaccination, 32% felt they were not at risk because they were young and took precautionary measures such as hand washing, and 29% reported that they would still attend classes even if they developed the flu (Ramsey and Marczinski, 2011, p. 3). The purpose of this Evidence Based Practice Brief is to examine the relationship between the severities of influenza cases on college campuses and the amount of vaccinations administered to college students. Nurses can use this information to promote evidence-based education on vaccinations within the implementation phase of the nursing process.

Jessica Romain (Major: Nursing)
Haley Adams (Major: Nursing)
Field of Study: Nursing

Mindfulness-Based Relapse Prevention and Substance Abuse Recovery

In people recovering from substance abuse, how does Mindfulness-Based Relapse Prevention (MBRP) affect their success? MBRP is designed to reduce the risk and severity of relapse following intensive abuse treatment by using mindfulness techniques and practices. Research on this technique is beginning to receive attention because of the evidence of its benefits. Meditation and mindfulness practices are now being utilized in a number of addictive disorder treatments. Over 20 million adults in the United States had a substance use disorder with an estimated 60% rate of relapse following treatment (Bowen et al., 2012). Because of the increasing numbers of patients with substance abuse, more people are turning towards mindfulness and meditative practices in order to successfully complete treatment and prevent relapse. People who received MBRP had lower rates of substance use and cravings while having an increase in acceptance and awareness (Witkiewitz, Bowen, Douglas, Hsu, 2013). Our findings could influence nursing interventions that involve patients in substance abuse recovery. The purpose of this Evidence Based Practice Brief is to examine if MBRP is an effective therapeutic intervention in substance abuse recovery.
Iulia Patru (Major: Nursing)  
Emily Blaylock (Major: Nursing)  
Morgan Calnan (Major: Nursing)  
Field of Study: Nursing  

**The Relationship Between Sleep Deprivation and Type II Diabetes**

Are adults who suffer from chronic sleep deprivation at an increased risk of developing type II diabetes compared to those who receive seven or more hours of sleep each night?

In society today, it has become increasingly common for people to get less than the recommended amount of sleep required per night (Al-Abri et al., 2016). With busy schedules full of work, family events, and more, sleep deprivation is something many people experience. The Centers for Disease Control and Prevention (CDC) recommends that adults aged 18-60 sleep at least seven hours per night, and states that one in three American adults do not get enough sleep (CDC, 2016). When a person receives insufficient amounts of sleep, many different body systems can be affected including metabolism (Al-Abri et al., 2016). Diabetes mellitus (Type II diabetes) can occur from the dysregulation of metabolism. It defects the cell membrane, which prevents the normal action of insulin and produces resistance. Due to this insulin resistance, higher levels of insulin are needed to drive glucose into the cells and over time, there is decreased insulin production in the body (Hoffman & Sullivan, 2017, p. 925). The purpose of this Evidence-based Practice Brief is to determine the relationship between sleep deprivation and the development of Type II diabetes. The results of this study may be used in the implementation phase of the nursing process to educate patients on wellness and illness prevention.

Felicity Linger (Major: Nursing)  
Emily Crews (Major: Nursing)  
Brooklynn Merja (Major: Nursing)  
Field of Study: Nursing  

**Circumcision and UTIs: Protective or Unnecessary**

Originally done only for religious reasons, circumcision is a procedure that involves the removal of the foreskin of the penis, leaving the head, also known as the glans penis, exposed. In America 56.9% of male newborns were circumcised in 2010 (Lee et. al. 2015). Many parents now opt for circumcision for religious, cosmetic, and hygienic reasons. One of the hygienic concerns of parents is urinary tract infections, more commonly known as UTIs. The purpose of this Evidence-based Practice Brief is to determine whether American males who are circumcised have a decreased risk for UTI’s as compared to American males who are not circumcised. The results of this project will be used during the implementation phase of the nursing process to help nurses provide evidence-based education to parents on the risks and benefits of circumcision.

Erin Askin (Major: Nursing)  
Fiona Bennett (Majors: Nursing)  
Kathryn Gilding (Major: Nursing)  
Field of Study: Nursing  

**How Intuitive Eating, as Opposed to Dietary Restraint, Affects Body Image of Women Ages 15-25**

According to the National Institutes of Health, “more than two thirds of adults are considered to be overweight or obese” (National, 2012). Additionally, 24 million individuals in the U.S. are diagnosed with an eating disorder, most of them being between the ages of 12 to 25 (Avalon, 2015). Is it possible to find a way to maintain a healthy weight while positively influencing body image and self-esteem? “Intuitive eating is an approach that teaches you how to create a healthy relationship with your food, mind, and body-where you ultimately become the expert of your own body” (Tribole & Resch, 2017).
In 1995, intuitive eating was formally introduced to the public. However, its key principles date back to concepts from the 1970’s. “Studies that encourage individuals to eat intuitively help participants abandon unhealthy weight control behaviors, improve metabolic fitness, increase body dissatisfaction, and improve psychologic distress” (Schaefer & Magnuson, 2014). The purpose of this Evidence Based Practice Brief is to bring awareness to women between the ages of 15 and 25, regarding how intuitive eating, when compared to dietary restriction, affects their body image. This information can be utilized by nurses during the implementation phase to educate patients, emphasizing a holistic approach towards enjoying and maintaining a healthier way of eating without restriction, while improving their self-esteem and perceived body image.

Catherine Sloan (Major: Nursing)  
Emily Spindler (Major: Nursing)  
Field of Study: Nursing

Relationship Between Telemedicine and Nursing Shortages

In the United States and Canada, how does the use of telemedicine compared to face-to-face patient care affect nursing shortages within the healthcare system? Telemedicine can be defined as the use of technology to deliver care to patients in rural settings using “real-time interactive services, including video consultation and mobile monitoring devices” (Hertz, 2013, p. 37). This technology helps the healthcare team to gather assessment data to provide adequate care for the patient, as they would normally in “face-to-face consultations” (Cannon, Jurski, & Ulferts, 2014, p. 95). The use of telemedicine in rural areas helps to address the nursing shortage dilemma in both the United States and Canada. Nursing shortages have been contributed to the growing age population, as well as the aging nurse-force, in which more nurses are at retirement age (Buchan, Duffield, & Jordan, 2015, p. 543). The purpose of this Evidence Based Practice Brief is to look at the relationship between telemedicine and shortages within the nursing field in the United States and Canada. The findings from this research can be used by nurses to support the management of patient care in areas with nursing shortages, such as rural hospitals. This knowledge, and the application of telemedicine, can be applied to both the planning and implementation stages of the nursing process.

Brooke Ruppenthal (Major: Nursing)  
Sara Chalich (Major: Nursing)  
Courtney Cloud (Major: Nursing)  
Field of Study: Nursing

Water Immersion Labor Pain vs Non-Water Immersion Labor Pain

Non-water immersion labor is the process during childbirth in which the woman may forgo water as an analgesic (pain relief) intervention and uses other tools such as pharmacological (medications) or other pain relief measures to ease labor discomfort. “Immersion in water during labor is a non-pharmacological method of managing labor pain that involves the pregnant woman's abdomen being completely submerged in warm water.” (Liu, Liu, Huang, 2014. p.1) The purpose of this Evidence-Based Practice Brief is to investigate pain management during labor by comparing immersion vs. non-immersion during labor. The brief will also research the outcomes and comparisons among the two methods related to the duration of labor, physiological changes and other pain relief measures. These findings will be used during the planning and intervention phase of the nursing process to help ease labor pain. Nurses in the labor and delivery field can use the water immersion method as an alternative intervention to implement and offer to birthing mothers as a possible empowering strategy for pain management.
Allison Trent (Major: Nursing)
Allison Dierenfield (Major: Nursing)
Field of Study: Nursing

**Use of Honey to Reduce Healing Time**

In patients who are undergoing wound treatment, will honey help to reduce healing times in comparison to standard wound care implemented by the healthcare professionals? “For thousands of years, honey has been recognized as a healing substance… Its unique qualities not only enhance health and beauty, but could also solve much of the world’s problem with antibiotic-resistant bacteria” (Tweed, 2016, p. 1). Throughout the history of medicine, many different plants and other natural remedies, such as honey, have been used for medicinal healing purposes. Currently, Western medicine uses mainly modern ointments, bandages, and antibiotics to heal wounds, however, the use of honey has emerged once again for wound healing on scrapes, burns, and ulcers. The purpose of this Evidence Based Practice Brief is to compare information and data on healing times associated with the use of honey on wounds and the use of modernized ointments and antibiotics on wounds. With this information, nurses will be able to apply the most effective wound care treatments for their patients during the implementation phase of the nursing process.

Allie Roberts (Major: Nursing)
Jordyn Johnson (Major: Nursing)
Karissa Procopio (Major: Nursing)
Field of Study: Nursing

**The Occurrence of Reported Medication Errors in 12-hour Nursing Shifts and Overtime**

A medication error is “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer” (National Coordinating Council for Medication Error Reporting and Prevention, 2015). According to the Food and Drug Administration (FDA) 1.3 million people in the United States die each year because of a medication error (2016). Based on data published by the Institute of Medicine (1999), it was found that medication errors not only were a prevalent problem but also that these errors were often attributed to the conditions of the facility as opposed to recklessness by the nurse. For example, according to Rogers et al. (2004), “The risks of making an error were significantly increased when work shifts were longer than twelve hours, when nurses worked overtime, or when they worked more than forty hours per week” (p. 202). The purpose of this Evidence Based Practice Brief is to investigate the relationship between medication errors by nurses during a 12-hour shift versus medication errors during an overtime shift. Because the focus of nursing surrounds patient safety, nurses can use this evidence to implement policies to help reduce the occurrence of medication errors. The information found will be used in the implementation phase of the nursing process. Once in place the policies will need to be evaluated to see if there was an improvement over time in the occurrence of reported medication errors.

Donovan Lucibello (Majors: Nursing and Biology)
Jacob Doney (Majors: Nursing and Health Sciences)
Field of Study: Nursing

**From Outputs to Inputs: Bacteria Solutions for *Clostridium difficile* Infections**

The purpose of this Evidence Based Practice Brief is to explore patient outcomes for *Clostridium difficile* (*C. diff*) infections comparing traditional antibiotic treatment protocols against fecal microbiota transplant procedures. Hospital readmissions for *C. diff* infections are problematic for health care agencies, regulatory agencies, and principally for patients. *C. diff* infections are particularly prevalent in patients with susceptible levels of commensal bacteria (gut flora) or in elderly populations (Halpin...
Evidence suggests that *C. diff* infections can be preceded by antibiotic therapy, which in effect, lowers all bacteria populations in the body including normal gut flora (Mizusawa, Doron, & Gorbach, 2015, p. 401). *C. diff* may already be present in an asymptomatic carrier at marginal levels, it is outcompeted by normal gut flora in healthy populations (Bagdasarian, Rao, & Malani, 2015, p. 401). Low levels of normal gut flora are favorable conditions for *C. diff* to flourish (Bagdasarian et al., 2015, p. 400; Halpin et al., 2016, p. 830). The contemporary treatment protocol for treating *C. diff* infections is additional potent antibiotics, which may have harsh adverse side effects for patients. Subsequent *C. diff* reinfections can lead to a fatal loop for vulnerable patient populations. Antibiotic treatments can put vulnerable patients in a fatal loop; however Nursing planning and evaluation can potentially circumvent this outcome. Nursing is well positioned to control infection and advocate for patient-centered evidence based therapies that show efficacious outcomes for treating *C. diff* infections in patients.

Kavida Naidu (Majors: Philosophy and Political Science)
Field of Study: Theatre

**Prison Theatre: Practicing Catharsis with U.S. Inmates**

In recent years, the practice of theatre in the criminal justice system has increased however, there is little study of its real role and purpose. This has led to questions such as, why has this practice become popular and how is it linked to traditional approaches of rehabilitation? Inmates in the United States are not only confined, but are also, many believe, dehumanized due to living conditions and treatment. In response to concerns over the daily lives of inmates, many prisons in the United States have started to introduce prison theatre programs intended to help inmates to overcome their dehumanization and alienation from society and the community. I contend that Prison Theatre helps prisoners to see themselves in a way that is not defined solely by the institution in which they currently live. This poster illustrates that through Prison Theatre programs, inmates are better prepared for reintegration to society. Prison Theatre allows inmates to reflect on their past experiences and on themselves, both of which provide opportunities to change their actions and criminal behavior for their own betterment and the betterment of society. This poster provides a definition of Prison Theatre and shows the raw figures of the current incarceration rate in the United States. Additionally, this poster reassesses the role of prison and reflects the relationship between theatre and prison. Finally, this poster shows images of successful examples of Prison Theatre programs that are currently operating in the United States while showing a significant decline in crime rates in states such as Michigan and Kentucky.

Tristin Agtarap (Major: Psychology)
Michael Donnelly (Major: Psychology)
Field of Study: Psychology

**Understanding Intelligence Through Writing**

This study was conducted to address the correlation between gender and age with perceived intelligence. The current study was conducted at Carroll College using 45 general psychology students. Previous research suggests that underlying gender and age biases influence how people judge the intelligence of others. This was tested through 2x2 repeated ANOVA measures. The study found that males were rated as more intelligent than females. In addition, older females were consistently rated lower on intelligence than any other group. An explanation for the findings can be explained through cultural biases, environmental upbringing, or societal norms. Future research should examine differences between male and female participants when rating intelligence. Furthermore, future research should address why older females are rated least intelligent. The importance of these findings better explain gender and age biases in everyday life.
Tristin Agtarap (Major: Psychology)
Jared Thielke (Major: Psychology)
Field of Study: Psychology

**Storytelling and Games Study**

The purpose of this study was to investigate whether the phenomenon of “ego depletion” is real and, if so, if simple lab manipulations would consistently induce depleted states that have measurable impacts on laboratory tasks. Participants were undergraduates at Carroll College exclusively drawn from the General Psychology Course. Participants wrote a 15 minute story about themselves and then played the game operation. There were two conditions. In the first, participants had to write their stories whilst avoiding the letters A and N. This is the depletion condition because these are common words and therefore it required cognitive effort on the part of the participants. In the second, participants performed the same task but without using the letters X or Z. This was the control because these are uncommon letters thus the writing should not require strenuous cognitive effort. Next all participants played operation where the researcher timed and rated them for accuracy. It was hypothesized that individuals’ who under go the depletion condition will perform significantly worse on the game in comparison to individuals who were in the control group.

Josie Ray (Major: Psychology)
Anna McCarthy (Majors: Theology & Psychology)
Field of Study: Psychology

**Effects of Priming on Female Social Behavior**

Women can be primed for aggression by watching video clips (Taylor & Setter, 2011). However, little research has been done on priming for empowerment, so this study tests to see if women can be primed for empowerment by watching video clips. Participants watched a short video clip portraying only females. They either watched an aggression video, an empowerment video, or a humorous video as a control. After watching the video, participants were directed to go down a hall and into another room where a researcher gave them a survey. As the participants came to enter the instructed room, they were blocked by two females arguing in the doorway. The researcher in the room timed to see how long it took the participant to interrupt the arguing confederates. After interrupting, participants were let into the room where the researcher gave them a survey that asked how empowered and aggressive they felt daily. Participants who watched the empowerment video interrupted significantly faster than those who watched the aggression or humor video. There was no effect between the time it took the participant to interrupt and their rating of how aggressive or empowered they feel daily. Our results show that women can be primed for empowerment just as they are for aggression by watching video clips portraying females.

Jared Thielke (Major: Psychology)
Andrew Campbell (Major: Health Sciences)
Michaela Kuefler (Major: Health Sciences)
Field of Study: Neurobiology

**The Effects of Vdac-1 on AMPA Receptor Trafficking**

AMPA receptors are the most commonly found receptor in the nervous system and are critically important for a variety of brain functions. They exist on the dendrites of post-synaptic cells and respond to the release of the neurotransmitter glutamate from pre-synaptic cells. A post-synaptic cell with many AMPA receptors will generate a strong signal in response to glutamate, whereas one with fewer AMPA receptors will generate a weaker signal. Currently, there is a gap in knowledge regarding AMPA receptor trafficking to these excitatory synapses. Because AMPA receptors have such a critical role in regulating excitatory neurotransmission that directly relates to learning and memory, research investigating the trafficking of these receptors to the synapse is important. This component of the research targets Vdac-1, a protein that forms ion channels in the outer mitochondrial membrane and plasma membrane allowing for the
diffusion of molecules and regulation of cell metabolism and cell death. In order to examine the effects of Vdac-1 on AMPA receptor trafficking, the messenger RNA encoding this protein was inactivated in Caenorhabditis elegans using RNAi and the corresponding effect on the AMPA receptor mediated behaviors of chemosensation and mechanosensation was observed. We predicted that knocking down Vdac-1 protein would lead to deficits in both of these AMPA receptor mediated behaviors.

Jacob Souza (Major: Psychology)
Connor Brandon (Major: Psychology)
Kaley Brouwers (Major: Psychology)
Rhiannon Sturgess (Major: Psychology)
Jared Thielke (Major: Psychology)
Field of Study: Psychology

**Relationship Between Memory and Exercise**

Previous research suggests that physical activity has an effect on neuroplasticity, cognitive functioning, and memory recall in both humans and animals (Hotting & Roder, 2013; Schmidt-Kassow, Mock, Zink, Thii, Vogt, Abel, & Kaiser, 2014). Our study investigates the effects of exercise on an individual’s memory. Participants were separated into two groups and given either a crossword puzzle to complete or led on a scavenger hunt. Each group was given the same clues to find the same corresponding words. Upon completing of the crossword puzzle or scavenger hunt, participants watched a five-minute National Geographic clip. The goal of this research was to see if exercise improved the participants’ ability to remember a list of words. The results supported the hypothesis and were determined by the number of words each participant recalled.

Amy Penaskovic (Major: Psychology)
Shaelynn Blixt (Major: Biology & Psychology)
Emily Holland (Majors: English Literature & Psychology)
Kayla Mack (Major: Psychology)
Lauren Paradis (Major: Psychology)
Field of Study: Psychology

**Mediating Factors of Stress on Performance**

The current study aimed to investigate the relationship between compliments, stress, and test performance. Participants were general psychology students and were placed randomly into three different groups: control, smiling, and compliment. Our hypothesis was that compliments would have a greater impact on reducing stress than smiling. Also, receiving a compliment before a math test would result in greater performance than smiling. Participants completed a one-minute long math test while their non-dominant hand was placed in ice water. Results showed that there was a small significant difference between the control and compliment group in terms of test performance, but not on stress levels.

Ali Becker (Major: Psychology)
Kevin Murphy (Major: Psychology)
Field of Study: Psychology

**Effects of Mindfulness Mediation on Test Scores**

Most people would agree that they perform at a higher level when stress is minimal. Research indicates that students with high stress and anxiety levels perform worse on math tests (Ashcraft & Kirk, 2001) than those experiencing lower levels of stress. Additionally, research has shown that mindfulness based techniques reduce stress (Davis & Hayes, 2011). Mindfulness can be defined as conscious awareness of the present moment (Niss, 2012). Studies have shown that brief mindfulness meditation exercises reduce anxiety and increase performance among high school students completing math exams (Niss, 2012). This study sought to further previous research on the effect of mindfulness meditation on test
performance. The study used a study skills training session for one group, and a mindfulness meditation training session for the other (control), in order to better prepare participants for their third general psychology exam. Training session number one included an hour-long group session consisting of study skills training and information regarding test preparation. Training session number two included an hour-long group session consisting of mindfulness meditation and relaxation techniques. Participants took the regularly scheduled exam number three in their general psychology course at Carroll College two days after completing training with the research team. A questionnaire was e-mailed to each participant prompting them to rate and evaluate the training session; questionnaires were either e-mailed back to the research team or turned into the general psychology professor. We then compiled participant’s test scores from test two, taken before the training ended, and test three, taken after the training. Follow-up analyses sought to find correlations between the individual rating of how often participants used the techniques they learned, and test performance in each group separately.

Alexandra Poulsen (Major: Psychology)
Janie Reid (Majors: Psychology/Sociology)
Field of Study: Psychology
Are More Narcissistic Individuals More Judgmental Towards Others When Viewing Social Media Accounts?

Previous research looked at the correlations between social media use and personality traits, and found that narcissists used social media more (Ryan & Xenos, 2011). A study that looked at selfies versus semi-professional photos found that those with semi-professional photos were judged more negatively than those with just selfies (Goodmmon, 2002). The researchers hypothesized that narcissistic individuals would score the social media account with mostly selfies as more narcissistic. Participants responded to the Narcissistic Personality Inventory (NPI), a self-esteem survey, and a Big 5 inventory. They also completed a filler, distraction task. After completion of the filler task, participants looked at either (a) pictures of nature on a social media account or (b) mostly selfies on a social media account, for 30 seconds. They didn’t look at the account again. The participants then filled out a final NPI post-survey about the the owner of the social media account they looked at. The participants’ answers about themselves were compared to how they rated the social media account. Those with higher reports of narcissism rated the nature condition as more narcissistic. Those with higher levels of Openness also rated the nature social media account as being more open. The self-report measures of self-esteem significantly correlated with the NPI post-survey.

John Bartlett (Majors: Biology/Theology)
Field of Study: Neurobiology
Developing a MAM Mouse Model of Cortical Dysplasia

Patients with neurological disorders such as epilepsy and schizophrenia show malformations of cortical development (MCD) in the hippocampus and surrounding cortex. The methylazoxymethanol (MAM) acetate E17 rat model has proven to be useful in determining the mechanisms of these malformations because it mimics the lack of development and neural circuitry in neurological tissue observed with MCD. Injecting the rats with MAM halts the neuronal development and migration throughout the brain. However, a similar mouse model has the potential to be even more efficient and advantageous in studying MCD. In this study, pregnant mice were injected intraperitonealy with MAM and Bromodeoxyuridine (BrdU). Behavioral assays consisting of a novel environment task and a Morris water maze were then performed to look for any behavioral as well as neurological structure differences that would confirm the effectiveness of the mouse model. Subsequently, the mice were euthanized for brain sectioning and immunohistochemical staining. Staining for c-Fos was done to identify the amount of neuronal activity in the hippocampus and BrdU staining was used to characterize the stage of development during which the MAM was injected. Statistical analyses were then performed to analyze the water maze trials and the c-fos and BrdU staining. We hypothesized that there would be an increase in neuronal activity in the hippocampus of mice injected with MAM, and the pathophysiology of the brain and behavioral differences would mimic that seen in the MAM E17 rat model.
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