2017

KAPP HONORS DAY

A CELEBRATION OF EXCELLENCE IN THE LIBERAL ARTS AT ALMA COLLEGE

THE 21ST ANNUAL

KAPP HONORS DAY

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Thursday, April 6, 2017 – *Classes Cancelled*

Honors Day Schedule

9:00–10:00 A.M.	**Concurrent Sessions I**
10:15–11:15 A.M.	**Concurrent Sessions II**
11:30 A.M.–12:45 P.M.	**Lunch** Honors Day Participants — *North Van Dusen Commons* All Others — *Hamilton Commons*
12:45–1:45 P.M.	**Concurrent Sessions III**
2:00–3:00 P.M.	**Concurrent Sessions IV**
3:15–4:15 P.M.	**Concurrent Sessions V**
4:30 P.M.	**Reception and Awards** – *Remick Heritage Center, Lobby* Kapp Honors Day Prize The Barlow Trophy Award Seniors Nominated: Kelsee Brinklow, Marissa Nivison, Cameron Spitzfaden

This spring, as it has for the past 20 years, the Alma College community comes together on Honors Day to celebrate one of the most fundamental aspects of collegiate education: the generation of new creative and empirical knowledge shared with all. The works presented today are from across the curriculum, not only building on and adding to human understanding, but in many cases challenging our very understanding of "disciplinary" expertise. Indeed, many of the panels today celebrate the richness of interdisciplinarity by approaching a common theme from a wide range of perspectives. Today's presenters have discovered new truths about the world and about themselves, and through their work they enrich us all. As these students share the outcomes of their work, we invite all of their friends, family and guests to sample the full range of research, performance and creativity on the schedule. Honors Day 2017 is a chance to discover the common themes and patterns of thought at the heart of the liberal arts experience. We're delighted to share, and we're glad you're here.

Thank you for your support,
The Honors Day Committee

COMMITTEE MEMBERS

Britt Cartrite, Chair
Dana Aspinall
Michael Bishop
Maya Dora-Laskey
Nanette Freed
Angela Kelleher
Alex Montoye
Jodie Reeves
Jessie Store

Gary Torgow

Honors Day Keynote Speaker

7 p.m., Wednesday, April 5, 2017, Remick Heritage Center, Presbyterian Hall

Gary Torgow, a Michigan business leader and chair of Chemical Financial Corporation, leads efforts to revitalize Detroit neighborhoods. He participated in the creation of the Detroit Home Mortgage Program, an innovative effort to increase home ownership by overcoming lending requirements that prevent individuals from receiving mortgages. The program was funded through a partnership of Detroit banks, national foundations and community non-profits.

The Chemical Financial Corporation is the holding company for Chemical Bank, which is the largest bank headquartered in Michigan. Chemical Bank recently merged with Talmer Bank, where Mr. Torgow previously served as founder and chairman. He also is the founder of the Sterling Group, a Michigan-based real estate, development and investment company, which has acquired, developed and operated a number of important landmark properties in southeastern Michigan.

Mr. Torgow is a member of the Board of Business Leaders of Michigan and the Detroit Downtown Partnership. He also is a trustee and board member of the Community Foundation of Southeastern Michigan and is on the foundation boards of Wayne State University and Henry Ford Hospital.

In addition, he serves as a trustee for Touro College and the Jewish Federation of Metropolitan Detroit and is the board president of Detroit's largest Jewish Day School, the Yeshiva Beth Yehudah. Mr. Torgow has served as a volunteer on numerous civic and communal boards, including the Detroit Economic Growth Corporation and the Michigan Civil Rights Commission, both of which he served as chairman.

He has won numerous awards, including the Frank A. Wetsman Leadership Award from the Jewish Federation of Metropolitan Detroit, the NAACP's Fannie Lou Hamer "Keeping the Spirit Moving" Award, and the Wayne State University Law School Distinguished Alumni Award.

Mr. Torgow is a graduate of Yeshiva University and Wayne State University School of Law and is a member in good standing of the Michigan Bar Association. He is married with five children.

The Barlow Trophy Award

Established in 1949 by Dr. Joel Barlow, a 1929 honors graduate of Alma College, the award recognizes academic achievement for students in the top 10 percent of their class as well as contributions to campus and community. The Barlow winner is determined by a vote of Alma's Student Congress and faculty.

KELSEE BRINKLOW has combined intellectual curiosity with campus leadership involvement during her four years at Alma College. A secondary education major, she plans to pursue a career as a history and social studies teacher. She is a member of the Phi Sigma Alpha and Phi Alpha Theta honors societies in political science and history.

On campus, Brinklow has connected with many students as a resident assistant in Newberry Hall since the beginning of her sophomore year and as a senior resident assistant — supervising all RAs in Newberry Hall — during her senior year. In addition, her work as a student admissions representative has allowed her to share her passion for Alma College with prospective students.

She joined the student organization Literacy Beyond Borders during her first year on campus and served as the group's secretary, a position she held until her senior year. She was one of two members to receive a Posey Global Fellowship scholarship to travel to Ghana to promote literacy and teach in a local primary school. The experience fueled her passion for preserving indigenous cultures and helping others to better understand their value.

Brinklow also was a member of the Public Affairs Institute, sang with the Alma College Choirs and volunteered in local schools with the Kids' Night Out and Reading Buddies programs.

A graduate of Chelsea High School, she is the daughter of Debra and David Brinklow.

MARISSA NIVISON has devoted much of her Alma experience to scientific study and research both on campus and internationally while also serving in student leadership roles and community volunteer activities. A psychology major, she plans to continue her education in a doctoral program and pursue a career researching parent-child relationships.

Her international internship experiences have taken her to Europe with funding assistance from the Posey Global Fellowship Program. During an internship at Leiden University in the Netherlands, she worked on a project examining dopamine's effects on positive parenting. In London, she assisted in a major study coordinated by Queen Mary University investigating resilience in Syrian War refugee children.

On campus, she has served as a research assistant in the e-STEM Cooperative Research Experience Program and as the student lab manager for the psychology department, assisting in studies that examine family relationships. She also has served as a teaching assistant, tutor and president of the Psi Chi psychology honors society and the Psychology Club.

Nivison also has participated in the Alma Middle School's After School Program, mentoring and tutoring children ages 8-14. In addition, she has been a First Year Guide to new students and a member of Active Minds and the Hispanic Coalition.

A graduate of Hebert Henry Dow High School, she is the daughter of Timothy Nivison and Jackie Nivison.

CAMERON SPITZFADEN has balanced a commitment to academic discovery and scientific research with student employment responsibilities, residence life leadership and performance in the arts. He is a double major in physics and mathematics with a minor in theatre and dance.

He has pursued multiple opportunities to conduct scientific research during his four years at Alma. Working alongside faculty sponsors, he has helped design and fabricate a robotic prosthetic hand. With funding assistance from the Venture Grant program, he studied biomolecular sensing during a summer research project at the University of Kentucky. His current senior research focuses on computer simulations of protein folding in mad-cow disease.

To help cover his educational experiences, Spitzfaden has selected on-campus jobs that directly impact the campus community. These positions include residence hall assistant, information technology help desk assistant, resident computer consultant, physical computing teaching assistant, physics and chemistry tutor, and French language teaching assistant. In his information technology roles, he has resolved student technology issues on a nearly daily basis.

He also has regularly contributed to the artistic vibrancy of Alma's campus, performing multiple times each year as a member of the Alma College Dance Department. He holds a leadership role in Pi Delta Chi, the dance honorary that promotes the study of dance to the campus and community through workshops and performances.

A graduate of Charlotte High School, he is the son of Erica and Laura Spitzfaden.

The Kapp Honors Day Prize

Research on film production, judicial reform, classroom behavior and health promotion garner top recognition at the 20th annual Kapp Honors Day.

Jonathan Clark, Jacob Fox, Kara Giles and Sara Schneider are the 2016 recipients of the Ronald O. Kapp Honors Day Prize for their outstanding Honors Day presentations in the humanities, natural sciences and social sciences.

The Kapp Prize is named for the late Dr. Ronald O. Kapp, an Alma College biology professor for 32 years and vice president of academic affairs for 20 years.

A panel of judges from each division — humanities, natural sciences and social sciences — selected the prizewinners after assessing the presentations for quality of scholarship as well as how the material was presented. The prize is open to all students and groups.

JONATHAN CLARK '16 of Cheboygan, presented "Surviving a Survival Film." In his study, Clark analyzed the process of creating a physically immersive film about a man's survival in the elements. His presentation focused on both the challenging aspects of cinema production in the wilderness and the realistic nature of long takes in cinematography for the purpose of creating an engaging survival film.

JACOB FOX '16 of Marysville, presented "The Political Professor: How Non-Government Intellectuals Influenced Franklin Roosevelt's 'Court Packing' Plan." In his study, Fox reviewed archival evidence to show how U.S. President Franklin Roosevelt used confidants, appointees and a number of politicized professors to formulate the "Court Packing" plan to expand the number of Supreme Court justices to save New Deal legislation.

KARA GILES '16 of Ithaca, presented "The Teacher as a Secure Base in the Classroom." In her study, Giles studied how different types of human attachment affect classroom behavior. She identified how educators can identify and help support students who are insecurely attached in the classroom. Her presentation included the sharing of results from her study on attachment in her second-grade classroom.

SARA SCHNEIDER '16 of Carson City, presented "Health Promotion in Schools." In her study, Schneider developed a school-based intervention that educates fifth-grade students at a local elementary school on how to engage in healthy eating and exercise habits in order to maintain health. The program includes a pre-testing evaluation, health lessons and a survey to assess student knowledge and attitudes regarding nutrition and physical activity.

MASON MOLESKY '16 of Alma, was awarded the nationally competitive CyberCorps Scholarship to pursue graduate study and a career in cyber security.

The scholarship, awarded by the National Science Foundation and the Department of Homeland Security, provides full funding for graduate school tuition, fees and books plus a living-expense stipend and professional development allowance for up to three years.

CyberCorps Scholar

Alma's 1st CyberCorps Scholar: Mason Molesky

Molesky, a mathematics major with a computer science minor, is pursuing his master's degree in cyber security at George Washington University. After completing the coursework, he will help protect the nation's information infrastructure by working as a security expert for the federal government.

"I am very excited and grateful to have received the CyberCorps Scholarship, and I look forward to my studies at GWU," says Molesky. "The opportunities offered by the CyberCorps Scholarship are life-changing, and I am eager to see what the future has in store for me.

"Cyber security is something I feel passionate about," says Molesky. "At GWU, there is an application process that is used to shrink the applicant pool. I met with the program director and professors several times and completed an interview before receiving the scholarship."

A dual-enrolled student while in high school, Molesky was heavily involved in campus activities as a full-time student. In addition to his academic work, he was involved with such student organizations as Alpha Phi Omega (service fraternity), Barrister's Society, Mathematics Club, Chemistry Club, Biology Club and the Alma Choir. He also worked multiple campus jobs, including network and system assistant for information technology, and served as a tutor for the mathematics and computer science department.

In addition, he was a meteorite/asteroid research assistant for a NASA-supported project under the mentorship of chemistry professor Melissa Strait.

"Alma College offers a wide variety of opportunities that have allowed me to succeed," he says. "My research on meteorites with Dr. Strait provided an excellent opportunity to build professional skills, face intricate problems, work with leading scientists, and encounter many other experiences to prepare me for a future career."

PROGRAM OF PRESENTATIONS

The day's program is listed in chronological order, by session. The information provided includes title, presenter(s), department, advisor and page number to find the abstract. Presentations are scheduled to last 20 minutes, including time for questions. Co-authors who are not presenting are indicated with an asterisk*.

CONCURRENT SESSIONS I: 9:00–10:00 A.M.

IA – SAC 109; Moderator: Hope Ayers

IB – SAC 110; Moderator: Mairi Clow

IC – SAC 113; Moderator: Emily Danks

ID – Dow L-1

IE – Dow L-4; Moderator: Krista Botting

IF – Clack Theatre

IG – Remick Heritage Center; Dance Studio

CONCURRENT SESSIONS II: 10:15–11:15 A.M.

IIA – SAC 109; Moderator: Lauren Kucharczyk

IIB – SAC 110; Moderator: Morgan Pell

IIC – SAC 113; Moderator: Deve Wishart

IID – Dow L-1; Moderator: Austin Desmarais

IIE – Dow L-4; Moderator: Kaydee Hall

IIF – Clack Theatre

CONCURRENT SESSIONS III: 12:45–1:45 P.M.

IIIA – SAC 109; Moderator: Emma Herron

IIIB – SAC 110; Moderator: Katherine Lehman

IIID – SAC 113; Moderator: Cheyenne Kalfsbeck

IIIE – Dow L-1; Moderator: Brooke Mason

IIIF – Dow L-4; Moderator: Alyssa Mohr

IIIG – Clack Theatre

CONCURRENT SESSIONS IV: 2:00–3:00 P.M.

IVA – SAC 109; Moderator: Paige Daniel

IVB – SAC 110; Moderator: Abigail Fergus

IVC – SAC 113; Moderator: Brianne Fitzpatrick

CONCURRENT SESSIONS V: 3:15–4:15 P.M.

The Influence of Stress on Cortisol Levels and Mind-Wandering Tendencies

It has been determined that negative moods, such as sadness or anger, can play a detrimental role on a person's ability to sustain attention on various cognitive tasks. Because of this, it was assumed that stress, a mood that is most commonly associated as being negative, may also affect attentional abilities. Participants in this study were subjected to either a stress or non-stress condition. In the experimental condition, participants were exposed to acute laboratory stressors in the form of difficult mathematical problems, time constraints, and noise distractions. Those in the control group were simply asked to solve simple mathematical equations. Cortisol levels were monitored before and after the cognitive tasks, in order to measure increases in stress. The participants were then asked to perform a task that measured their attentional abilities. After comparing the data, differences in cortisol levels, as well as attentional abilities, were observed. These results show individual differences between both the experimental and control groups, indicating that stress may play a role on attention.

Kilee DeBrabander '17
Hometown: Marshall, MI • Major: Psychology
Faculty Sponsor: Dr. Zachary Shipstead

The Effect of Accessible Health Insurance and Prenatal Care on Low-Income Pregnant Women's Nutritional Statuses

Prenatal care, although necessary, is known as one of the most expensive services in the health care system. This may be problematic for low-income pregnant women who cannot afford health insurance, as their limited access to prenatal health care can result in reduced intake of folic acid, lowering their overall nutritional status and adversely affecting their baby. The purpose of this study is to analyze whether access to health insurance and prenatal care among pregnant women are associated with their nutritional status, especially folic acid intake. Using the National Health and Nutrition Examination Survey (NHANES) from 2003-2014, the study population includes women who are currently pregnant (n=746). The study estimates folic acid intake and overall nutritional status among pregnant women based on their access to health insurance and prenatal care using the multivariate regression models. Access to health insurance and prenatal care are associated with women's nutritional status during their pregnancy, specifically related to their folic acid intake. Furthermore, pregnant women without health insurance do not seem to have adequate access to prenatal care and her nutritional status during pregnancy. This study may shed light on the importance of proper access to prenatal care and adequate nutrition intake during women's pregnancy.

Alex Horan '17
Hometown: Grand Haven, MI • Major: Biology
Faculty Sponsor: Ms. Hyun Kim

Effect of Depressive Symptoms on Substance Abuse in Young Adults

Depression is one of the most prevalent mental disorders, while risky behaviors, such as smoking, alcohol consumption and illicit drug use, also remain an issue among young adults. Early smoking has shown a positive association with drug and alcohol consumption as well as increased risk for developing depression, although depressive behavior has not been linked to subsequent smoking of tobacco. This study further examines depression as a positive indicator for smoking, alcohol consumption, and illicit drug use, such as marijuana, cocaine and heroin, in order to identify health risks in young adults. The data come from the National Health and Nutrition Examination Survey (NHANES) from 2011-2012 and 2013-2014, and the study is comprised of young adults aged 18-35 years (n=3,273). Depressive symptoms are analyzed using the Patient Health Questionnaire (PHQ-9) which assesses frequency of depressive symptoms. The study uses multivariate regression models to investigate whether depression is likely to provide an incentive for smoking, alcohol consumption, and illicit drug use, as depressive symptoms are associated with these risky behaviors among young adults. This study may aide health and educational professionals in identifying and diagnosing depressive persons at risk for smoking, alcohol consumption and illicit drug use.

Hannah Garn '18
Hometown: Charlotte, MI • Major: Integrative Physiology and Health Science
Faculty Sponsor: Ms. Hyun Kim

MILO: A Novella

Meet Milo: a young teen traumatized by his acupuncturist father's sudden violent death. Struggling with self-harm and depression, Milo soon finds a strange solution to his grief: getting a piercing. Something about metal puncturing below skin surface gives Milo a deep sense of connection. His burgeoning friendship with piercer Web Marley only deepens his sense of belonging and tentative healing. As he grows up and continues collecting piercings and connections, Milo finds himself at the head of a growing social movement,

Biodiversity QR Trail: Making Scientists Out of Every Citizen and Student

Forest Hill Nature Area, owned by the Gratiot-Isabella Regional Education Service District Board (RESD), encompasses 90 acres of land. Previously home to a farmstead and before that pre-settlement forest, the reserve provides great opportunity to research and educate on topics of biodiversity and succession. In the effort to create citizen scientists in the Gratiot and Isabella counties' communities and schools, I have helped to create a "digital nature trail" or "Biodiversity QR Trail." This allows anyone with a mobile device to scan QR codes mounted on markers alongside the nature trail. Naturalists will learn about the microhabitat at the station and enter "real-time" data related to a question about the nearby location. All entries will be compiled and these data will be made accessible to the public and to schools through the Dow Digital Science Center website. While a basic layout of the QR stations has been prepared and will be outlined in my presentation, I am in the phase of collecting audience feedback and opinion to later apply to the trail. Honors Day will provide me a useful forum of scientists, educators and citizen scientists to help better develop the goal of this project in spreading the use and appreciation of science by all people.

Abigail Fergus '18
Hometown: Holland, MI • Majors: Biology, Environmental Studies
Sponsor: Dr. David Clark

Piercing Nation. In this movement, people get matching piercings with one another to cement bonds and declare interconnectivity. As the phenomenon of Piercing Nation spreads, Milo struggles with fame, relationships, and his own body, now weighted down by thousands of piercings, stories, and followers. Excerpt: Milo didn't like to touch people; he preferred to shatter them. He shied away from casual shoulder nudges and pinky brushes. He wanted full contact: the hugs so tight they almost hurt but that held two people together, hands that held only while foreheads kissed, lips that kissed only when bodies twined together. Piercing touches, not poking, not brushing. A tie between the superficial surface and the deep internal, forged with metal and blood.

Taylor Card '17
Hometown: Shelby Township, MI
Majors: Spanish, English
Faculty Sponsor: Dr. Robert Vivian

Book Conservation

Old books can tell us much about their contemporary time; binding styles, materials used, and the content of the book are all essential pieces. Unfortunately, books are particularly subject to damage due to the delicate nature of their materials and the amount they are used. Book conservation is essential to preserving these windows into the past. The American Conservation catalogue will be used for information on how to wash, treat, and rebind the book. The techniques learned will then be applied to one of the old books growing mold at Alma College's library. The book will be taken apart, cleaned in water baths, and then re-sewn as close to the original binding style as possible. The motto of conservation is to do no harm to the piece, so if anything cannot be fixed, it will be left as is. Conservation work is essential to artifacts such as books, pieces of art, and archeological pieces because it helps preserve a culture that doesn't exist anymore. Through these items, we can learn about history in a tactile way. Time will deteriorate any object; conservation is key to allowing generations to come use these precious artifacts.

Allison Schneider '19
Hometown: Dexter, MI • Major: Undecided
Faculty Sponsor: Dr. Daniel Wasserman

Weird Things People do With Literature

People do weird things when they read. On the surface, this seems like a simple fact, and yet it becomes incredibly difficult to pin down why it happens. In my thesis, I explore this question, and posit that if we examine the people who read, rather than the texts that are read, we may discover the answer. Based on personal research, I connect current social psychology with Reader Response literary theory to conclude that there are multiple factors — a construct of the reader, a construct of the author, the text, and contexts of reader, author, and text — that feed reader interpretation, and therefore make interpretation flexibly open and individualized. By examining the transcripts from my research, I argue that these factors are used at different levels of intensity by the reader, and all, except the text, are constructed by the reader. By placing the emphasis on the individualization, it becomes clear that the act of interpretation is influenced more by who the reader is than what text is being read. Therefore, people do weird things with literature because no two readers are the same, and therefore no two interpretations will contain the same information.

Jessica Bigelow '17
Hometown: Perry, MI • Major: English
Faculty Sponsor: Dr. Laura von Wallmenich

Integrating Dance and Reading Comprehension

Whether or not arts should be integrated into education is an ongoing debate within many school systems. While some educators believe the arts are a distraction and should be cut from school curriculum, others believe that arts integration helps students gain a better understanding of the curriculum. Proponents of the arts integration approach cite increased student engagement and interest as benefits of integrating arts into the curriculum. This study explored the effect of an arts integration approach; specifically dance, on reading comprehension. Drawing from experimental design approach, the control group learned with the traditional curriculum, which did not integrate dance, and the experimental group learned with dance and reading integrated together. Six second graders and 13 third graders participated in the study. The effects of dance and reading integration differed between informational texts and fictional texts. The benefits of integrating dance with fictional texts proved to be greater. Educational implications are discussed.

Katia Hamamouche '17
Hometown: Carmel, IN • Major: Education
Faculty Sponsor: Dr. Jessie Store

How is Perception of Organic Food Influenced?

This study will be used to understand what influences perception of organic food, and how that influences purchasing behavior. Research has shown that consumer's motives for purchasing organic are because it is healthier, tastes better, and is better for the environment. The purpose of this study is to understand how and why perceptions of organic food is formed, and how to break down those stereotypes for the consumers and marketers. This was done by completing focus groups with participants who expressed that they regularly purchase organic food products over conventional food products.

Sara Stemen '17
Hometown: Livonia, MI • Major: Communication
Faculty Sponsors: Dr. Janie Diels,
Dr. Amanda Harwood

Fragile States and Failing States

This presentation explores the conditions that cause some states to become increasingly fragile and, in some cases such as Somalia, South Sudan, and parts of a number of other countries, for governmental structures to collapse completely. This empirical analysis draws together research from a wide array of fields, including economics, history, sociology, anthropology, and political science to test extant hypotheses against a novel database developed in the Political Science Senior Seminar this term.

Erika Brown '17
Midland, MI • Majors: Political Science, Psychology

Luke Ashton '17
Hometown: Omaha, NE
Majors: Political Science, Anthropology

Haley Daugherty '18
Hometown: Clarkston, MI • Major: Undecided

Eric Frontzak '18
Hometown: Naperville, IL • Major: Undecided

Sabrina Gambill '17
Hometown: Portland, MI • Major: Political Science

Jeremy Johnson '17
Hometown: Howell, MI • Major: Political Science

Madison Kraning '18
Hometown: Howell, MI • Major: Political Science

Kelsey Postema '18
Hometown: Marshall, MI
Majors: Political Science, Economics
Faculty Sponsor: Dr. Britt Cartrite

Failure of Pharmacologic Interventions to Improve Exercise Performance at High Altitude

The purpose of this study was to test the efficacy of four medications expected to offset the decrement of athletic performance at altitude. In this double blind, placebo controlled, matched cohort design study, subjects (N=102) participated in a three-day trip to high altitude (10,000-13,000 feet). Subjects were assigned to one of five groups (placebo control, metformin, quercetin, nifedipine + methazolamide, oral nitrate). Over six hours, subjects were transported from Michigan to Breckenridge,

Colorado. Subjects completed the Army Physical Fitness Test (APFT) three times: twice (screening, performance) at sea level and once at altitude. The APFT consisted of a two-mile run, timed sit-ups, and timed push-ups. Subjects were matched based on the average screening and performance APFT trial measurements. A one-way ANOVA with planned comparisons was used to determine if participants in each treatment group performed better than participants in the placebo group at altitude. Comparisons were also made between the performance and altitude trials for each of the groups. Two-mile run time was significantly slower ($p<0.05$) in the nifedipine + methazolamide group relative to the placebo group (1066 ± 134 sec vs. 940 ± 113 sec). Furthermore, the nifedipine + methazolamide group performed significantly fewer sit-ups compared to the placebo group at altitude relative to the performance trial (-8.8 ± 10.6 vs. 1.0 ± 13.1). However, there were no differences between the placebo group and the metformin, quercetin, or oral nitrate groups for any of the APFT measurements. In summary, metformin, quercetin, and oral nitrate were not effective at improving performance, but nifedipine and methazolamide taken together adversely affected physical performance.

Allison Brown '17
Hometown: Middleville, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. John Davis

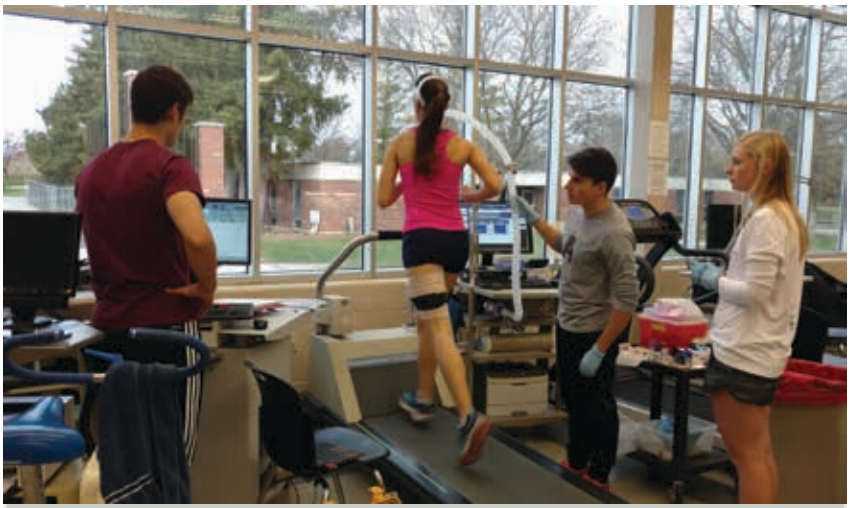
Incidence of Postural Orthostatic Tachycardia Syndrome in a College Population

This study focused on a disorder known as POTS — or Postural Orthostatic Tachycardia Syndrome. POTS is a dysautonomia that causes orthostatic intolerance when a sufferer is changed from the supine to upright position. Seventy Alma College women between the ages 18-21 participated as the subjects of this study. The participants performed a stand test so that their beat-to-beat blood pressure, heart rate, and baroreceptor sensitivity could be measured. The stand test was then used to assess the capability of the subject to regulate their blood pressure upon changes in position. POTS patients typically feel dizzy or lightheaded upon standing. Thirty percent of the subjects tested in this study met the criteria for POTS — which is defined by the presence of excessive tachycardia (a heart rate increase of 30 BMP or more, or over 120 bpm) within the first 10 minutes of standing.

Cristyn Pawluk '17
Hometown: Waterford, MI
Major: Integrative Physiology and Health Science

Katherine Lehman '19
Hometown: Haslett, MI
Majors: Integrative Physiology and Health Science, Chemistry

Ashley Mattson '18
Hometown: Gwinn, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. John Davis



Increases in Maximum Oxygen Consumption and Lactate Threshold Predict Improvements in Race Performance During a Cross Country Season

To our knowledge, the relationship between many physiological adaptations due to in-season training and their impact on racing performance remains unclear. The purpose was to investigate multiple physiological variables that contribute to the greatest improvements in 6,000m cross country race performance. Nine female collegiate cross country athletes (1.8+0.1m, 59.6+3.9kg) were evaluated four times throughout their competitive cross country season: pre-season (T1), mid-season (T2), preceding the championship phase (T3), and after the championship phase (T4). Subjects completed a graded exercise test to exhaustion on a motor driven treadmill. Oxygen consumption was measured by a Parvo TruOne 2400 Metabolic cart. Near-infrared spectroscopy (Portamon, Artinis Inc.) was used to measure tissue saturation index (TSI) of the Vastus Lateralis. Lactate Thresholds (LT) were determined by a Nova Biomedical handheld lactate analyzer. Changes in these variables along with standardized race performance times were analyzed. VO_2 max significantly increased ($p<0.05$) from T1 to T2 (51.6 + 3.2 ml/kg/min to 56.6 + 4.3 ml/kg/min) indicating an average gain of 9.7%. These gains remained until T4. The slope of the TSI became significantly more positive from T1 (-14.8 x10-3 + 6 x10-3) to T4 (-11.9 x10-3 + 5 x10-3), indicating less of a decline in muscle deoxygenation. Five of the nine subjects increased their performance from Race 1 to Race 3, where the changes in VO_2 max and LT explained 69% and 72% of the variance in increased racing performance, respectively. On average, VO_2 max, LT, and muscle oxygenation improved from pre- to mid-season. The greatest gains in VO_2 max and in LT from pre-season to mid-season correlated to the greatest improvements in racing performance. These data suggest that of the variables measured here changes in VO_2 max give the best estimation of racing performance, but changes in LT give the best estimation for increased racing performance.

Kaitlyn Arnold '17
Hometown: Jackson, MI
Major: Integrative Physiology and Health Science

Payton Hirschenberger '20
Hometown: Freeland, MI • Major: Undecided

Brooke VandePolder '19
Hometown: Zeeland, MI • Major: Undecided

Jeffrey Schlicker '18
Hometown: Standish, MI • Major: Biology
Sponsor: Dr. John Davis

Bound

I created this dance work as a means of addressing the stigma of mental health, specifically depression and anxiety. “Bound” is an opportunity for me to address the important, but often overlooked point of view of that of the support system. I created the sound score by combining sound effects and song to develop and convey a mood of panic. The dance begins with abrupt movement patterns to show agitation and stress. Later the dancers transform into movement with soft, floating qualities to convey self-actualized hope. In viewing this dance, I find it important that the audience experience some form of transformation. Just as the dancers have their own internal inspiration for the movements, the audience is free to interpret the dance in a way that is meaningful to them.

Choreographer: Sadie Gelb ’19
Hometown: Indianapolis, IN
Major: Theatre and Dance - Dance

Katherine Bruck ’18
Hometown: Essexville, MI • Major: Chemistry

Kathryn Kalamaras ’18
Hometown: Crystal Lake, IL
Major: Theatre and Dance - Dance

Audrey Ortiz ’17
Hometown: Midland, MI • Major: Physics

Kathryn Troxell ’18
Hometown: Shepherd, MI • Major: Undecided

Vivienne Walton ’17
Hometown: Greensboro, NC
Majors: Psychology, Theatre and Dance - Dance
Faculty Sponsor: Ms. Crystal Fullmer

Synergy; The Interactive Edition of *Pine River Anthology*

We will begin with a short lecture of our schedule and production timeline, then the presentation of this year’s publication, Synergy, the first ever interactive edition of *Pine River* as readers can color the cover. Following the presentation of Synergy, our Web Editor Josie Sabo will show our updated website. We will end our lecture and presentation with screenings of short films submitted by NMS students as well as readings from the authors whose written work was selected.

Emily Price ’17
Hometown: Grand Rapids, MI
Major: Art and Design

Josie Sabo ’17
Hometown: Coopersville, MI
Majors: New Media Studies, Art and Design

Marcella Flury ’17
Hometown: Dearborn Heights, MI
Majors: New Media Studies, Art and Design

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Hometown: Alma, MI • Major: Art and Design

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A Comparative Analysis of NFL and NCAA Concussion Litigation: A Health Crisis that Hurts

Following the unexpected death of Pittsburgh Steeler Hall of Famer Mike Webster in 2002, forensic pathologist Bennet Omalu put the National Football League under the spotlight with the alarming results of Webster's autopsy. The initial diagnosis of chronic traumatic encephalopathy — better known as a concussion — instilled an immense amount of fear in the public and more specifically in past, present, and future football players. The trauma from a concussion triggers a progressive degeneration of the brain that can result in memory loss, confusion, impaired judgment, aggression, depression, and progressive dementia. Because of these frightening potential impacts, athletes have begun to question whether or not the NFL and National Collegiate Athletic Association (NCAA) has succeeded in its duty to protect players by providing sufficient warnings of the dangers associated with participating in the heavy contact sport of football. This study addresses the legal aspects of this debate — analyzing various lawsuits that have been filed against the NFL and NCAA and comparing and contrasting the responses from these organizations. Furthermore, recommendations to the NFL and NCAA to decrease their liability in concussion litigation will be addressed.

Kylie Hamilton '17
Hometown: Grand Rapids, MI
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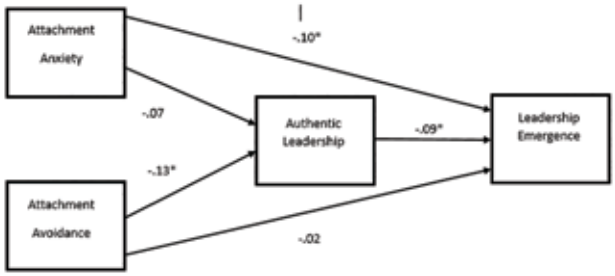
Faculty Sponsor: Dr. Elizabeth Cameron

Immediacy and the Collegiate Player: Analyzing Coaching Methods and Their Effect on Players

As a coach, it is your obligation and privilege, at any level of the sport, to instill this sense of pride and devotion to these simple activities. Coaches' communication tools and attitudes influence a persons' ability to escape reality through absolute immersion into the game, whether you're playing it or consuming it. Coaching styles and methods should be relative to the situation and player they are coaching. These adaptations assist in a players' satisfaction and overall performance in their sport. Focus groups, field analysis, and implementation have allowed me to deduce that coaching has crucial results in a players' well being and attitude toward their sport.

Steven Luomala-Kipp '17
Hometown: Linden, MI • Major: Communication
Faculty Sponsor: Dr. Janie Diels

Influences of Attachment Style and Birth Order on Authentic Leadership in the Workplace



Attachment style is a sufficiently stable individual difference with roots in early childhood that predicts outcomes during adulthood, including one's leadership style. Authentic leadership is characterized by openness, trust, support, and appropriate emotional displays. Leader emergence is the act of being identified as a leader by others. Given the characteristics of authentic leadership, we proposed a mediated model in which authentic leadership mediates the link between attachment and leader emergence. A sample of 405 employed Alma College alumni responded to an online survey measuring attachment style (Experiences in Close Relationships—Revised), authentic leadership (Authentic Leadership Questionnaire), and leader emergence (the highest level within an organization to which participants had risen). Using path analysis and controlling for age, sex, race and education level, we found that the link between avoidant attachment style and leader emergence is fully mediated by authentic leadership. We also found that anxious attachment style has a significant direct effect on leader emergence with no indirect effect through authentic leadership. These findings suggest that attachment style predicts authentic leadership and leader emergence. Consequently, attachment style could be useful as a predictive construct for hiring leaders in organizations.

Charles Fales '17
Hometown: Olivet, MI • Major: Psychology
Faculty Sponsor: Dr. Brandi Stupica

Evaluating Grub Damage to Assess the Annual Imidacloprid Application at Alma College

In April of 2016 a report on pesticide use on Alma College's campus was prepared by several faculty and staff to evaluate the potential risk of pesticides applied. One recommendation was to further evaluate the need of impidacloprid. Imidacloprid is a neonicotinoid pesticide historically used on Alma's campus for the prevention of Japanese beetle grubs, but has negative effects on non-target species such as the honeybee. Upon the recommendation of the report, imidacloprid was not applied in July 2016. In order to assess the actual need of such a treatment, I conducted a grub survey in the fall of 2016. Areas of apparent grass damage around campus were evaluated using a standard procedure to test for grubs. I surveyed the sports fields, all of north campus and the lawns surrounding the south campus dorms. Of the 22 sites surveyed, two instances of grubs were found. Since minimal grub damage occurred, the cost and risk to pollinators or other non-target species may outweigh the limited benefit to apply this product. Additional research is required to confirm that this would be true in subsequent seasons.

Abigail Fergus '18
Hometown: Holland, MI • Majors: Biology, Environmental Studies
Faculty Sponsor: Dr. Amanda Harwood

The Winter Foraging Area of the American Kestrel (*Falco sparverius*) as Observed Within its Northermost Range

Central Michigan is at the northernmost edge of the American kestrel's, *Falco sparverius*, winter range. Since 2007 we have observed 24 kestrels outfitted with radio-transmitters in order to determine where and how much time individuals spend within the study area. Studying kestrels at the northern range limit can help us to more fully understand how stresses can effect individuals' behavior. To relocate birds a transmitter was used to track a bird's location. Each bird was attempted to be relocated by car several times a week by circling the last place the bird was seen. Each area was covered in a mile radius in order to attempt to locate each individual, this search was conducted from January to March. Since 2007 it was observed that three individuals were never relocated again, one individual was only relocated once, and 20 individuals were relocated more than once. In this presentation, we will discuss what we have found about the difference between the time male and females spend at their supposed foraging area.

Amber Tuttle '17
Hometown: Kalamazoo, MI • Major: Biology
Faculty Sponsor: Mr. Michael Bishop

A Study Comparing the Effects of a Neoprene Sleeve Versus a Functional Knee Brace on the Performance of Female Athletes Post Anterior Cruciate Ligament Reconstructive Surgery

The neoprene sleeve (NS) has been found to be viable replacement for functional knee braces (FKB) post anterior cruciate ligament (ACL) reconstructive surgery (Tiggelen et al., 2008). However, females below the age of 25 preferred the FKB over the NS (Birmingham et al., 2008). The purpose of this study is to further investigate the functional performance effects of a NS and FKB. It was also the aim to assess individual preference for the interventions through a modified ACL Quality of Life questionnaire. A within subjects design was used where participants performed five functional tests with the FKB and NS in a counterbalanced order. Females between the ages 18 and 25 who have undergone ACL reconstruction surgery within the last five years were recruited to participate in the study. All participants were cleared to return to physical activity by their physician. Following the functional tests, individuals completed a questionnaire about their experience and preference with the interventions. We anticipate individuals performing better with the FKB than the NS which would support previous research. We also anticipate that the participants will feel more confident when using the FKB.

Emily Brady '17
Hometown: Hillsdale, MI • Major: Athletic Training
Faculty Sponsors: Mr. Brett Knight, Dr. Christopher Aiken

The Historiography of Maori Cannibalism, 1769 to the 21st Century

During the exploration of New Zealand in the 18th century, the accounts of European explorers, such as James Cook, Joseph Banks and Julien Crozet, have led to many interpretations of the Maori people, especially in regard to cannibalism. In the voyages of Cook and Banks in 1769 and then Crozet in 1772, they each wrote different views on the cannibalism of the Maori. While Banks was completely disgusted, Cook seemed rather indifferent and saw it as a consequence of culture. Crozet had many negative views of the Maori, especially after the death of Marion duFresne. Modern scholars have read these journals for their first-hand accounts of Maori cannibalism. These scholars have had different opinions on Maori cannibalism: some say that it developed due to a lack of meat, and others, such as John White explained cannibalism as a part of Maori religious practices. Anthropologists, like F. Allan Hanson and Anne Salmond, have written about cannibalism as an aspect of Maori culture, while Gananath Obeyesekere questioned whether cannibalism actually existed among the Maori before Cook arrived. Given these diverse interpretations, this paper seeks to identify the different trends that have occurred in the viewpoint and scholarship on Maori cannibalism.

Chelsey Cobb '17
Hometown: Millington, MI • Major: History
Faculty Sponsor: Daniel Wasserman

How Progressivism Contributed to a New Conservatism: William Volker, Harold Luhnow, and Municipal Reform

In 1910, the immigrant, businessman, and philanthropist William Volker pioneered the first publicly funded welfare department in the United States. Volker's wealth would later be used by his nephew Harold Luhnow to support staunch libertarian views in opposition to New Deal liberalism. This work argues that Luhnow's support for the New Right did not always occur in spite of his uncle's earlier progressive commitments, but sometimes because of them. In making this argument regarding Volker's legacy, this work is also arguing that elements of progressive municipal reform, seeking to purge political corruption, contributed to emerging postwar conservatism. In taking this approach, this work cites the official biography of William Volker, Harold Luhnow's unpublished account of his uncle's life, and newspaper articles from the *Kansas City Star*. Further sources are drawn from progressive municipal reformers, including William H. Allen. Allen and related figures illustrate the broader municipal reform movement (active from New York to Detroit to Kansas City) and the assumptions of those who fit within the progressive era's general political philosophy. Both liberals and conservatives of the postwar era largely ignored any relationship between the new conservatism and former progressivism, and historians since have generally under-emphasized these connections.

Joshua Pretzer '17
Hometown: Mt. Pleasant, MI • Major: History
Faculty Sponsor: Dr. Edward Lorenz

Do Liberals and Conservatives Speak Different Languages?: A Neo-Wittgensteinian Understanding of Sociopolitical Discourse

It has become a common truism that sociopolitical polarization has permeated the public sphere. Often, this polarization is attributed to a divergence in worldviews and ideologies,

and thus the breakdown of sociopolitical communication is attributed to this as well. What I suggest here, however, is that the breakdown in sociopolitical communication is not singularly caused by ideological polarization. Instead, by applying insights from the philosophy of language, I argue that the conception of language offered by Ludwig Wittgenstein and the ordinary language philosophers allows us to conclude that, broadly construed, liberals and conservatives speak different languages in virtue of belonging to separate and distinct linguistic communities. Thus, sociopolitical discourse is not only plagued by ideological differences, but by linguistic ones. And this, in turn, assists in explaining why communication throughout sociopolitical discourse is often unsuccessful.

Charles Oswald '17
Hometown: St. Louis, MI • Major: Philosophy
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From Shrinky-Dinks to Micro-Optics

Our goal for this project is to use a low cost fabrication method for optical micro-components. The method is based on the use of thermoplastics (like shrinky-dinks) to fabricate the mold and PDMS as structure material. In our presentation, we show that it is feasible to fabricate simple structures for optical use, although additional work needs to be done to evaluate dispersion and attenuation.

Brianna Fitzpatrick '18
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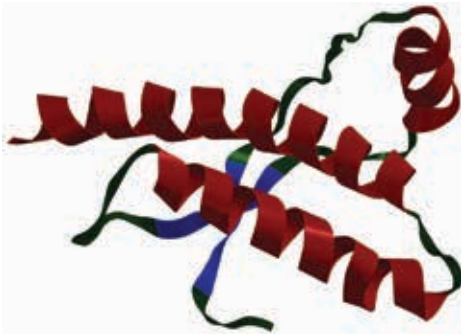
Drones in the Public Eye

In the recent past, drones have become a common object in the public eye. Unfortunately, much of what people hear about them are incidents of misuse. In my thesis, I aim to challenge this negative stigma and bring to light the positive industrial uses for drones. Drones are being used in industrial settings for everything from real estate to farming. In these fields, drones are proving to be a valuable tool. Take for example using a drone to check a power line. A small, battery-powered drone with an infrared camera can be used as a substitute for a person having to climb individual poles and step into a potentially dangerous situation. Public fear of drones contributes to the strict regulations that are currently in place. Until recently drones were categorized as small aircraft. Putting a remote-controlled device in the same category as a plane that carries many gallons of combustible fuel seems misguided. In my presentation, I will argue for the value of drones in an industrial setting by first explaining their misrepresentation. I then will move into profiles of how drones are being used in industrial settings. I hope to call attention to opportunities this new technology provides.

A Molecular Mechanics Study of Prion Misfolding in Mad-Cow Disease

Prion diseases such as mad-cow disease and Creutzfeldt-Jakob disease, which are currently incurable, are transmitted by a misfolded protein. According to recent laboratory studies, the human prion protein, hPrP, assumes a misfolded conformation upon contact with other misfolded hPrP monomers, destroying the nervous tissue of the host. The misfolded structure of hPrP has not yet been identified. In this study, we use computer simulations to determine how the protein might deform and examine whether our results are in reasonable agreement with the hypothesized mechanism. Understanding the conformational changes that occur in hPrP is important in discovering how to prevent the transmission of prion diseases.



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Hometown: Marshall, MI • Major: New Media Studies
Faculty Sponsor: Dr. Anthony Collamati

Validation of a Biometric Smart Shirt for Assessment of Physical Activity

Purpose: Determine validity of the Hexoskin smart shirt device. Methods: Participants (n=32) wore a Hexoskin while performing 14 activities in a laboratory and on a track (lying, sitting, standing, walking at various speeds and inclines, jogging, and cycling). Steps, kcals, heart rate, and breathing rate and volume were measured by the Hexoskin and compared to criterion measures. Results: The Hexoskin had low mean absolute percent error (MAPE) for steps (9.4%), with the Hexoskin performing worst for slow walking speeds. MAPE was low for heart rate (2.4%). The Hexoskin had high MAPE for kcals (27.9%), and had high MAPE for breathing rate and volume (19.4%, 33.6%). Conclusion: The Hexoskin has utility for measurement of some, but not all, physical activity and physiologic variables which it measures.

Joseph Mitrzyk '18
Hometown: Standish, MI
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Co-author: Mr. Monroe Molesky
Faculty Sponsor: Dr. Alexander Montoye

Assessing Physiological Function During a High-Altitude Hike Using Real-Time Monitoring

Assessing the physiological responses to exercise at high altitude in real time or using cloud-based data storage has important implications for remote monitoring of human health and well-being in challenging environments. Purpose: To determine the feasibility of using real-time monitoring to assess the cardiovascular responses to a simulated climb for military operations. Methods: Seventy-four male (age = 21.9 + 2.2 yrs, height = 1.78 + .02 m, weight = 78.2 + 9.7 kgs) sea level (SL) residents volunteered to participate in this study after giving informed consent and completing the Army Physical Fitness Test. Subjects were flown from SL to high altitude (HA) and completed a 5.9-km hike with a 35-pound rucksack that began at 3239 m and finished at 3840 m the morning after arrival at HA. They were instructed to complete the course as fast as possible. Heart rate (directly from ECG), breathing rate and depth, and step count (cadence) were assessed using a shirt with built-in sensors (Carre Technologies inc., Hexoskin). In 73 out of 74 of the subjects, the Hexoskin was effective at collecting all of the hike data. For analysis, the 5.9 km course was divided into four equal segments (Segment 1= 0-25%, 2= 25-50%, 3= 50-75%, 4= 75-100%) based on step count. Elevation gain for each of the segments was determined from topographical maps (Segment 1 = 123 m, 2 = 178, 3 = 142 m, and 4 = 262 m). Average and maximal heart rates were calculated for each of the segments. Results: Average heart rates were 140.1 + 18.1 bpm, 161.9 + 5.8 bpm, 159.2 + 6.4 bpm, and 161.5 + 6.2 bpm respectively for the four segments corresponding to 74.5%, 86.1%, 84.6%, and 85.9% of estimated heart rate max. The heart rates reflected the elevation gain except for Segment 4, which had the greatest elevation gain but similar heart rates to Segment 3. Further analysis of the Hexoskin data indicate that subjects had more stops during this segment (73% of all stops occurred in Segment 4) which resulted in an overall lower average. Conclusions: These results suggest that real-time monitoring for multiple variables simultaneously (heart rate, ECG, step count) in

the field is a viable means of assessing physiological function and simulating a military operation with a 610 m elevation gain results in relatively high heart rates that generally reflect elevation gained.

Nicholas Fox '17
Hometown: Mayville, MI • Major: Biology
Allison Brown '17
Hometown: Middleville, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. John Davis

Effect of Salt Supplementation on Heart Rate, Blood Pressure, and Baroreceptor Sensitivity in Women With POTS

Postural Orthostatic Tachycardia Syndrome (POTS) is a form of orthostatic intolerance that is marked by excessive tachycardia and symptoms such as dizziness, lightheadedness, or syncope. To date, there are very few management strategies available for POTS patients to utilize. Therefore, the purpose of this study was to examine how salt supplementation affects heart rate, blood pressure, and baroreceptor sensitivity during lower body negative pressure (LBNP) on women that have been previously identified as presenting with symptoms consistent with POTS. Ten college-aged female subjects that previously demonstrated the symptoms of POTS through the use of a stand test participated in this study. Each participant completed two trials: a baseline trial and experimental trial. Before each trial, the subject provided a 24-hour urine sample, specifically collected at hours 8, 16, and 24. The baseline trial consisted of the consumption of a placebo treatment for a five-day period prior to an LBNP test. The LBNP increments were 0, -20, -40, -60 mmHg until presyncope, with three minutes of measurements at each increment. Heart rate, beat-to-beat blood pressure, and baroreceptor sensitivity (BRS) were recorded through a noninvasive blood pressure monitoring system. The same procedure occurred during the experimental trial, except with the consumption of 1.5 mmol/kg slow-release NaCl tablets for the same amount of time. After each trial, a seven point symptomatic survey was distributed. It is expected that BRS and blood pressure during the orthostatic challenge will increase after salt supplementation. Additionally, it is expected that orthostatic tolerance and subjective symptoms will improve after salt supplementation. This study will be important to potentially determine a new management technique for POTS.

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Hometown: Waterford, MI
Major: Integrative Physiology and Health Science
Ashley Mattson '18
Hometown: Gwinn, MI
Major: Integrative Physiology and Health Science
Katherine Lehman '19
Hometown: Haslett, MI • Majors: Integrative Physiology and Health Science, Chemistry
Faculty Sponsors: Dr. John Davis, Dr. Maurie Luetkemeier

Alma College Writing Center Panel Presentation: Tips for Writing Essays

Based on their conversations with student writers in the Alma College Writing Center, a selection of tutors have constructed a panel presentation to explain several key tips for writing college-level essays. The first presentation will focus on tips to craft an effective college-level essay title and how a successful title ultimately sums up the essay's thesis. The presenter will emphasize the practice of crafting titles to shape an essay's argument overall and offer title examples. The second presentation will highlight the importance of the second paragraph in a college-level essay, as the second paragraph is an area of play between the thesis and the argument. The discussion will then shift to the third presentation on how well-crafted transitions contribute to the validity and success of an essay's argument. The presenter will provide writers with techniques to effectively transition from the thesis and between paragraphs. In the final presentation, the presenter will discuss the implementation of rhetorical hooks. Because this is an aspect of the paper that is commonly overlooked, the presenter will give tips on employing them to leave a lasting impression on readers.

Paige Daniel '18
Hometown: Waterford, MI • Major: English
Dalia Barghouty '18
Hometown: Rochester, MI • Major: English
Margaret Rausch '18
Hometown: Wyandotte, MI • Major: English
Jessica Bigelow '17
Hometown: Perry, MI • Major: English
Christopher Nolan '19
Hometown: West Branch, MI • Major: English
Faculty Sponsor: Dr. Anne Porter

Sherlock: The Fan Focus

Sherlock Holmes is a household name internationally. There is something about Arthur Conan Doyle's "Sherlock Holmes" short stories that attracted and maintained a fanbase which has thrived for over a century, provoking hundreds of adaptations and reinterpretations. One of these adaptations, BBC's "Sherlock" is a TV show about a re-imagined Sherlock living in modern London. The TV show managed to successfully replicate much of the popularity of the original, spawning its own enormous fanbase and fan production. Both of these texts integrate a confluence of three factors — intimacy, seriality, and mystery — that invite fans into the text to play in interesting ways. By examining how the character John Watson is integral to the audience's connection to Sherlock, it is possible to see the intersection of the three factors at work; more specifically, it is possible to see what it is that is happening in the text that invites fan play. Additionally, by studying various fan-made works, the way that this play happens around these texts becomes clear.

Taylor Card '17
Hometown: Shelby Township, MI
Majors: Spanish, English
Faculty Sponsors: Dr. Matthew Cicci, Dr. Laura von Wallmenich

Social Media Marketing: What Works?

Americans spend approximately one-third of their time viewing social media sites, and most of this viewing takes place on mobile devices (Crain Communications Inc., 2016). It is projected that businesses will spend over $43.6 billion in 2016 alone on social media marketing (Crain Communications Inc., 2016). With the increasing use of social media by consumers, it is no wonder that the field of brand management via social media marketing is rapidly developing. Interestingly, there is a lack of concrete research that examines which types of social media posts and interactions are most effective. Present research on social media marketing techniques notes that the more interactive consumers are with a company's social media, the more they identify with the brand (Gensler, Volckner, Yuping and Wiertz, 2013; Singh and Sonnenburg, 2012). This has many positive consequences such as increased brand trust, brand identity, and brand loyalty (Gensler et al., 2013; Laroche, Habibi and Richard, 2013; Singh and Sonnenburg, 2012). However, many questions still remain including: How do managers create a social media environment that effectively influences consumers while enhancing brand identity? Using focus group method-

Disruption of Hydrous Chondrite Meteorite Analogs

Understanding the fragmentation of asteroids is important for investigating the origins of meteorites and interplanetary dust. Research into asteroid impacts uses meteorites as analogs for asteroids. Nearly 50% of the main asteroid belt is predicted to be hydrated material. Previous work found that anhydrous ordinary chondrites disrupt differently than hydrous carbonaceous chondrites. Carbonaceous chondrites and other hydrous meteorites are rare and limited access greatly impedes further research into these samples. Ongoing work attempts to hydrate ordinary chondrites to produce the mineralogy and structure of carbonaceous chondrites. Meteorites and analogs are both disrupted at the NASA Ames Vertical Gun Range. Analyzing the size distribution of particles after disruption has proven to be a good technique for comparing these events. Infrared scans and scanning electron microscope analysis of the artificially hydrated material show that the minerology has become more akin to carbonaceous chondrites. Collecting size distribution data from disruption events shows that a new matrix forms through the analog creation process. Size distribution data also show that the analogs' disruption pattern is trending away from that of an ordinary chondrite to a shape more similar to carbonaceous chondrites.

Brian May '18
Hometown: Frankenmuth, MI
Majors: Computer Science, Mathematics
Faculty Sponsor: Dr. Melissa Strait

ology, this study investigates ways for social media communication to best impact and influence consumers.

Hope Ayers '17
Hometown: Marysville, MI • Major: Communication
Faculty Sponsor: Dr. Janie Diels

The Art of Video Games

Developing a strong artistic ability and an understanding of the complex nature of classical art is an important foundation for modern art and digital media in today's era of technology. Video game design is a very popular and evolving form of art using interactive media. From the classical oil paintings to digitally animated characters in video games, media has developed and is continuing to grow into new forms of expression. In video games, one can find heavy inspiration from the classical arts. For example, the aesthetics of a video game are what gives players the visual component of a setting, allowing the player to visualize the scene to better understand the context of a game. This is similar to the aspects of a classical art piece with its own scenery and characters interacting within them. Both of these media use visual context to explain a story and to give relevant information. Video games also use other aspects of classical art to make the interactive media more pleasing, such as composition, symbolism, color theory, etc. These principles of classical art are necessary to build the groundwork of all forms of art including the newer forms of media like video games.

Zachary Meyer '18
Hometown: Shelby Township, MI
Majors: Art and Design, New Media Studies
Faculty Sponsors: Ms. C. Sandy Lopez-Isnardi, Dr. Andrew L. Thall

Automated Waterway Examiner

Our objective is to engineer an Automated Waterway Examiner (AWE) that will gather waterway characteristics wirelessly and more effectively than hands on man-hours in the field. Success of this project will be determined by accuracy of data collected from select areas in the Pine River. The mechanism will undergo a quality assurance (QA) study to comparatively analysis the automated data collection with traditional probe data collection techniques. The question that the Automated Waterway Examiner will be designed to address is if a feasible machine can be made to carry out a researchers work. My hypothesis is that not only can such a machine be created with today's technologies, but it also can collect data in a more timely, efficient, and inexpensive manor. The reasons behind such a machine are numerous and important. In many scenarios contaminated waterways are unsafe for human interaction; with an autonomous vehicle scientific data collection can go where no human should or could go. This is also highlighted in the convenience that runs at night and even in undesirable climates can be made effortlessly. Researching from along or even in waterways takes many man-hours and an automated boat will essential be a "just add water" job.

Quinton Cook '17
Hometown: Ortonville, MI • Majors: Physics, Environmental Studies

Braxton Platt '20
Hometown: Hart, MI • Major: Undecided
Faculty Sponsors: Dr. Victor Argueta-Diaz, Mr. Murray Borrello

Brawn Over Brains: Independent Muscle Specific Control of Molecular Clocks

Human physiology and behavior is organized into 24-hour cycles known as circadian rhythms. These rhythms play an important role in many disease pathologies, and have long been understood to be controlled by the brain, utilizing light cues to match/entrain the body with the day/night cycle of the external environment. Recently, control of these rhythms has been shown to extend beyond the brain. Within each somatic cell is an intrinsic molecular clock mechanism maintaining that cell's circadian rhythms. This mechanism can function independently of the brain's control, and even be entrained by cues other than light. This clock's positive arm is driven by dimer formation of the bHLH proteins, BMAL1:-CLOCK. The gene targets of these dimers are often tissue specific. There is evidence that this specificity results from interactions between the Clock mechanism and tissue-specific transcription factors. In muscle, a strong candidate for this tissue-specific transcription factor is MYOD1. This presented research will show that the over-expression of BMAL1:-CLOCK with MYOD1 results in the synergistic transactivation of muscle specific proteins. Additionally, there is preliminary evidence that exercise can serve as an entrainment factor for the muscle molecular clock, which could have a significant impact on exercise as a therapeutic intervention.

Nicholas Arnold '17
Hometown: Reese, MI
Majors: Business Administration, Biology
Faculty Sponsor: Dr. Karen Ball

Psychological Influences on Knee Function Following Anterior Cruciate Ligament Reconstruction

Two important aims of recovery from an ACL reconstruction are functional ability of the knee and patient confidence. Psychological aspects of recovery have been shown to work for and against recovery. Despite the physical success of ACL reconstruction, many athletes do not feel ready to return to sport. This research will look at the psychological influences on the function of the knee. Testing will include 15-20 participants ages 18-25 who have previously suffered an ACL tear in collegiate or high school competition and have since had ACL reconstruction. Participants will perform a one-legged hop, beginning with the control (uninjured leg), a carioca test, and a shuttle run test. Following functional testing, participants will complete the Knee injury and Osteoarthritis Outcome Score (KOOS), then the ACL-Return to Sport after Injury scale (ACL-RSI). Finally, participants will complete a questionnaire prepared by the researcher including questions of graft type, time of injury, time of surgery, sport in which the injury occurred, and whether the individual has returned to sport. The results will be analyzed by the researcher.

Kelly LaPorte '17
Hometown: Livonia, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Mr. Phillip Andre

Birth Order, Sibling Attachment and Romantic Relationships

There is limited literature on the interaction between birth order, sibling attachment and romantic relationships. Parental attachment has been the primary focus when looking into attachment in romantic relationships. However, the attachment one has with one's siblings — the longest relationship the average person will likely experience in their lifetime — may be equally important. The current study examined the connection between birth order, sibling attachment and romantic relationships, specifically the correlation between participants' attachment to their best friend, significant other, adult siblings and parents, as well as the interaction of participants' birth order and participants' significant other's birth order on relationship assessment and beliefs. Participants rated 20 dating profiles based on attractiveness and took six surveys regarding their feelings, beliefs and attachments in close relationships. A bivariate Pearson correlation was computed to assess the relationship between attachment to siblings and mothers, fathers, best friends and significant others. Participants' avoidant attachment to their oldest adult siblings was significantly correlated with avoidant attachment to their mothers and fathers and anxious attachment to their significant others. Participants' anxious attachment to their oldest adult siblings was significantly correlated with anxious attachment to their mother and second oldest adult sibling, and avoidant attachment to their mother.

Lillian Slavin '17
Hometown: Bloomfield Hills, MI • Major: Psychology
Faculty Sponsor: Dr. Brandi Stupica

Effects of Reduced Knowledge of Results Frequency on Motor Learning

The learning of motor tasks can be facilitated by performance based feedback. Research has shown a benefit to a variety of feedback schedules when learning a novel task. More recent research has focused on learner-controlled feedback schedules. What is still unknown is if allowing control over feedback is more beneficial to learning than other practitioner generated schedules. The purpose of this study is therefore, to assess various feedback protocols on the performance and learning of a novel motor task. Participants tossed a bean bag at a circular target with 10 concentric rings. Individuals were blindfolded during the experiment so that feedback could be provided. Feedback was provided regarding the accuracy of a toss based on the ring score and quadrant of the target the bean bag landed in. The study consisted of four experimental groups where individuals controlled the amount of feedback (SC), were yoked to the SC feedback schedule (YK), had a faded frequency (FD), or bandwidth schedule (BW). Acquisition consisted of 50 trials followed by a retention and transfer test 24 hours later. It is anticipated that the participants that were able to control the amount of feedback they received will experience the largest gains in skill acquisition.

Brianna Bianconi '17
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Faculty Sponsor: Dr. Christopher Aiken

Evaluating the Toxicity of Pine River Sediments Downstream From the Velsicol Superfund Megasite, St. Louis, MI

Downstream of the Velsicol Superfund site has had historic contamination of numerous chemicals including DDT, PBB, and HBB among others. Remediation and sediment dredging near the site began in spring of 1999, and was completed in 2006. In 2011, the Michigan Department of Environmental Quality completed a Baseline Assessment Report Long Term Monitoring Plan for the Pine River. This report revealed that downstream from the Velsicol Superfund site, there were several locations with levels of DDT that were still greater than 50 parts per million. However, there has been limited assessment of the benthic community since this evaluation. The objective of this research was to determine if Pine River sediment downstream from the superfund site was still toxic to aquatic macroinvertebrates. Three sites were selected downstream and an upstream reference site was used. At each site, macroinvertebrates surveys were conducted and sediments were collected for laboratory toxicity tests for mortality and sublethal effects using Hyalella azteca and Chironomus dilutus. This study indicated that the most severe impacts might be limited to areas within a few miles downstream. However, more research is needed to evaluate potential effects on ecosystem function and other riparian species.

Grace Sutherland '17
Hometown: Waterford, MI
Major: Environmental Studies
Faculty Sponsor: Dr. Amanda Harwood

Effects of Low and High Contextual Interference on Learning a Novel Motor Skill

Contextual-Interference effect is a learning phenomenon where high levels of interference during practice is beneficial to skill learning (Porter, et al, 2007). One sport that still fails to implement recommended practice schedules, like increased CI, is golf. This study investigated the effects of both learning and performance of three different golf chip shots via practice using low and high amounts of contextual-interference. Thirty-two participants with no formal golf experience were recruited from the college community. Participants were randomly assigned to the low or high CI practice group, 16 participants per group. Each participant practiced three variations of a golf chipping skill: chipping from a flat, an uphill, and downhill lie. Participants had an acquisition phase of 18 trials of each skill for a total of 54 trials, blocked transfer test of six trials, and a random transfer test of six trials. Our results demonstrate that both groups improved significantly from the beginning to end of acquisition. Furthermore, a significant difference between groups was found with the random transfer test, the random group outperforming the blocked group, $p<.05$. The results suggest, specifically for golf, that instructors and athletes should develop practice schedules that provide elevated levels of CI in order to increase performance and learning.

Alec Genter '17
Hometown: Clarkston, MI • Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Christopher Aiken

Increased Autonomy Facilitates Learning in a Self-Control Protocol

The purpose of this study was to investigate the effects of increased autonomy in a self-control protocol. Thirty participants practiced putting a colored golf ball to the center of a target placed 4m away. The target had eight concentric circles and the acquisition phase consisted of 50 trials. Individuals were quasi-randomly assigned to either a high (HA) or low (LA) autonomy group. HA chose the color of the ball prior to each practice trial whereas LA chose the ball prior to each practice block (five trials). Participants then filled out a modified Basic Need Satisfaction survey to measure autonomy. Twenty-four hours following acquisition, individuals performed a five-trial retention test and a five-trial transfer test from a distance of 5m. During acquisition the groups improved their putting performance throughout the practice trials ($p<.05$) but did not differ significantly from one another ($p>.05$). HA had significantly better performance during the transfer test ($p<.05$) but not during retention ($p>.05$). Results of the questionnaire did not reveal a significant difference between the groups ($p>.05$). The results from this study suggest that increasing autonomy during practice through an increase in choice facilitates motor skill learning.

Helen Geddes '17
Hometown: Brighton, MI • Major: Integrative Physiology and Health Science

Nicole Deel '16
Hometown: Alma, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Christopher Aiken

The Efficacy of Flexibility in Relation to Functional Movement Screening of Collegiate Dancers

Much research in regards to dancers and sports medicine is limited and inconclusive, compared to research of collegiate athletes. The purpose of the study was to see how testing flexibility during the Functional Movement Screening may or may not affect injury prevalence in dancers when compared to research data of collegiate athletes of Divisions I-III. My hypothesis supports that an increase in flexibility will result in an improved FMS score, which will support a decreased likelihood of injury occurrence. This study consisted of performing the FMS pre- and post-dance season. Before the testing began, each subject had to answer a short, two question survey about their previous injury history. Before each screening, in order to reflect the participant's flexibility, the dancers performed three stretches: floor touch test, sit and reach test, and the back scratch test. Based upon the participant's FMS score, the researcher implemented a corrective exercise program for the dancers in which they had to report to the athletic training room once a week for participation. Information gained from the FMS can prompt dancers for potential injury prevalence as well as making sure dancers are physically prepared to participate in any dance related activity in the future.

Alia Jones '17
Hometown: Plymouth, MI
Major: Athletic Training
Faculty Sponsor: Mr. Brady Hopkins

Plyometric Training in Water vs. Plyometric Training on Land and Comparison of Various Plyometric Measurements

The purpose of this study is to investigate the effects of plyometric training in water compared to plyometric training on land. This study is to evaluate which medium will be more effective for plyometric training, in water or on land, for an athlete involved in a plyometric specific sport. There will be a specific five-week plyometric exercise training program, in which participants will complete the exercise on land or in the water. Measurements will be taken a week before the program and a week after to show overall improvement. Benefits of this study are the increased knowledge of plyometric training, and athletes gaining increased plyometric abilities.

Darby Kahler '17
Hometown: Coldwater, MI
Major: Athletic Training
Faculty Sponsor: Ms. Danielle Knight

Cryotherapy and Lactic Acid Accumulation in Athletic Performance

Cryotherapy is a common modality among many sports medicine facilities. There is little evidence, however, to justify its use for improving athletic performance. Cryotherapy has many beneficial effects including vasoconstriction, pain reduction, and aid in the healing process by decreasing inflammatory process. Cryotherapy has its place in recovery, but there is a gap in literature between cryotherapy and the accumulation of lactic acid. Also it has not been shown directly to aid with performance enhancement, which is its primary use in athletics. Thus, it is important for an effective modality to decrease blood lactate for an increase in performance. This study will look into the effects of cold water immersion on blood lactate and athletic performance among Division III male football players.

Ty Jensen '17
Hometown: Grayling, MI
Major: Athletic Training
Faculty Sponsor: Ms. Danielle Knight

Senior Art and Design Majors' Show

The Senior Show is the capstone requirement for all graduating students majoring in Art and Design. The product of a years' preparation, the senior class organizes every aspect of the show from publicity, installation, and receptions to the completion of their individual series. During the presentation, viewers can discuss works with the exhibiting artists and learn about the vast array of media, techniques, and themes on display.

Emily Allison '17
Hometown: Jackson, MI • Major: Art and Design

Sarah Bishop '17
Hometown: Alma, MI • Major: Art and Design

Marcella Flury '17
Hometown: Dearborn Heights, MI
Majors: Art and Design, New Media Studies

Reilly N. Gordon '17
Hometown: Rochester Hills, MI
Major: Art and Design

Emily Price '17
Hometown: Grand Rapids, MI
Major: Art and Design

Josie Ellen Sabo '17
Hometown: Coopersville, MI
Majors: Art and Design, New Media Studies

Annamarie Williams '17
Hometown: Midland, MI
Major: Art and Design

Faculty Sponsors: Dr. Daniel K. Connolly, Ms. Jillian D. Dickson, Mr. Benjamin C. Lambert, Ms. C. Sandy Lopez-Isnardi

Migrant Rights and International Law: U.S. Policy and the Crisis in the Northern Triangle

While some organizations have identified the current situation of violence in the Northern Triangle of Central America as a refugee crisis, this thesis argues that according to the 1951 Refugee Convention and the current legal definition of a refugee, this situation should not in fact be characterized as such. By exploring the current situation on the ground in the Northern Triangle and looking at the changing demographic of migration flows from Central America to the United States, this thesis examines current U.S. immigration policies and investigates why these policies have proven ineffective in addressing migrants fleeing Central America. While the majority of these migrants may not qualify for asylum or refugee status, the U.S. should reexamine its policies and adapt to the recent changes in migration flows, instead of falling back on enforcement tactics as it has done in the past.

Samantha Kulhanek '17
Hometown: Shelby Township, MI
Majors: Spanish, Foreign Service
Faculty Sponsor: Dr. Derick Hulme

Disassociation and Disconnect: How Diaspora Begets Duplicity

Jhumpa Lahiri, a well-renowned author of short stories (as well as a few novels), write stories focused primarily on characters of South Asian ancestry, many of whom experience diaspora. The narratives of these stories follow the families in them and diaspora affects the interactions and development of each character. Specifically in her novel *Unaccustomed Earth*, Lahiri tells the stories of both "Hema and Kaushik." These two have experienced different forms of diaspora relative to their families and cultures, providing an inherent disconnect from their own identities. While Hema was born and raised in the United States with Indian parents who clung to their culture, Kaushik's parents moved back and forth between India and the United States with primarily upper class, American tendencies. Lahiri illustrates these two characters and their duplicitous identities. Their disconnect from both cultures stems from their identities as second-generation immigrants. This disconnect that Hema and Kaushik feel, which many immigrants feel, illustrates their disconnect from not only their own cultures, but even from each other. This paper attempts to examine this disconnect and how it stems from the duality of culture and language that specifically second-generation immigrants experience.

Deve Wishart '18
Hometown: Troy, MI
Majors: Secondary Education, English, German
Faculty Sponsor: Dr. Prathim Dora-Laskey

Belonging Here, There and Nowhere: Experiences and Education of Third Culture Kids

A Third Culture Kid (TCK) is a child who spent a significant period of their developmental years in a culture outside their parents' passport cultures (Pollock and Van Reken, 2009).

There are approximately 50.5 million expatriates worldwide with TCKs, and this number will continue to grow with globalization (Paragon Relocation, 2014). It is therefore imperative to continue researching on lives and experiences of TCKs to realize the Education for All policy. This qualitative research reports TCK's in and out of school experiences that emerged from 28 structured interviews with teachers, parents, and school aged TCKs. It focuses on those who have been a TCK for at least one year between ages 6 and 18. Results include a 'lost' sense of identity, failure of schools systems to analyze TCKs educational backgrounds, misdiagnosed learning disabilities, and conflict between pride in global identities and other people's deficit view of such identities. Member checking and multiple coders built in validity and reliability. The findings of this study are significant in helping educators and policymakers to develop rich educational experiences based off a holistic understanding of TCKs, which is necessary in this age of immigration as a norm.

Rachel Nemeth '17
Hometown: Perry, MI
Majors: Music, Secondary Education
Faculty Sponsor: Dr. Jessie Store

Hitler's "Democratic" Partner: Anglo-American Diplomacy with Finland During the "Continuation War," 1941-1944

Though Finland garnered sympathy during the 1939-40 Soviet-Finnish "Winter War" due to its democratic government and British and American anti-Communist sentiment, the Western Allies dramatically shifted policy following Finland's joining Hitler's invasion of Russia in June 1941. They adopted two different Finnish policies: the British declared war against Finland in December 1941, whereas the Americans retained diplomatic relations until summer 1944, never declaring war. This study, using memoirs, newspapers, and British and American diplomatic records, examines these approaches in light of Anglo-American relations with their Soviet ally. The primary goal was the defeat of Germany; preserving the Soviet Union was therefore more important than preserving Finland. Anglo-American relations with Finland attempted to ease the strain of the Axis war effort on the Soviet Union. While the British declared war to appease their Soviet ally, the Americans engaged the Finns from late 1941 to early 1944 in an attempt to push them toward peace with the Soviets. Though the Americans failed to remove Finland from the war, maintaining relations with Finland helped this small, democratic nation to negotiate a peace treaty with the Soviets in the fall of 1944 which allowed its continued independence.

Shane Cooper '17
Hometown: Parma, MI • Major: History
Faculty Sponsor: Dr. Patrick Furlong

U.S. Support of Polish Solidarity

This paper is a detailed analysis of the Carter administration's response to the rise of Solidarity in Poland. The rise of the trade union presented a unique dilemma for the Carter administration. Despite the nature of Solidarity, as an independent trade union, the Polish regime's compromises with the union threatened to bring a Warsaw Pact invasion. The paper uses documents from the Carter Library to describe the fine line walked by the Carter administration, supporting the union but avoiding invasion. Ironically, two of the administration's highest level cabinet positions were filled by leaders of Polish descent: National Security Advisor Zbigniew Brzezinski and Secretary of State Edmund Muskie. Consequently, the administration was both prepared and concerned with the wider consequences for both Poland and the U.S. if Solidarity survived and thrived. Yet, in this period when an end of the Cold War seemed either unlikely or far in the future, the administration had to balance a dying détente policy that kept the peace within Poland and between East and West, and an unknown alternative which Solidarity's emergence forced on the administration as well as on the Polish leadership.

Danialle Stebbins '17
Hometown: St. Johns, MI
Majors: Foreign Service, History, Political Science
Faculty Sponsors: Dr. Liping Bu, Dr. Edward Lorenz

Social Unrests Impact on the 2016 Presidential Election

The 2016 Presidential Election had a surprising outcome with the election of President Trump. Many experts failed to predict the outcome. However, Allan J. Lichtman, from American University, got it right, even though he wished Trump would lose. Dr. Lichtman developed a theory in the 1980s of 13 keys that would predict the outcome of an election based upon perceptions of the performance of the incumbent party. His keys correctly have predicted the outcome in the past eight elections. The prediction that Dr. Lichtman made was correct, however, one key that he chose not to turn was one that I believe should have been turned; specifically the eighth key. My paper will explain why I would have turned the key because the levels of social unrest that existed during this election cycle. I will show how 2016 was comparable to years when Dr. Lichtman turned the eighth key. Through analysis of certain election cycles when Dr. Lichtman turned the social unrest key, I discussed the impact of social unrest at that time and how manufactured social unrest may have had an impact on the outcome of this election cycle due to the media portrayal of the prevalent social unrest.

Gabrielle Alter '19
Hometown: Grand Rapids, MI • Majors: Psychology, Religious Studies
Faculty Sponsor Dr. Edward Lorenz

Women and Feminist Photography

Since its inception, photography has been one of the few art forms where women have had a consistent voice. Yet women have also long been the hidden voice in photography. Whether their husbands forbade them from touching a camera or society deemed they were too fragile and gentle to work as a photographer, women's work in photography has been hidden behind their male counterparts' work. In the 1960s, with the birth of the sexual revolution, came the explosion of feminist photography. Women made powerful political statements commenting on the repression of women in society. From then till now, women's photographic artwork has changed the way society has viewed women and minority groups. While feminist photographers all come from different racial backgrounds, sexual orientation, and gender identities, they all share a desire to spread awareness about social inequality. My project focuses on the birth and development of feminist photography as a movement and its use as social commentary. I begin with the sexual revolution, explore iconic, feminist photographers, and end with my own work, which focuses on modern struggles concerning gender and sexuality.

Domenica Dalla-Vecchia '20
Hometown: Lansing, MI • Major: Undecided
Faculty Sponsors: Ms. C. Sandy Lopez-Isnardi, Mr. Jonathan Arlt

Neville Longbottom: The Hero We Do Not Immediately Recognize

In J.K. Rowling's *Harry Potter* series, the reader immediately recognizes that Harry Potter is the hero of the story. However, there is another character that exhibits heroic qualities that the reader does not initially recognize as a hero because of his nerdy and clumsy qualities — Neville Longbottom. In fact, throughout the seven books, Neville parallels Harry in several important ways and he exhibits similar heroic potential from the start of the series. However, these qualities are largely masked from the reader until the fifth book. Neville serves as an important counterpoint to the kind of hero represented by Harry Potter. Lacking the special destiny of Harry, he represents the everyman, the average person, and the capacity for heroism in everyday forms. Neville's ordinariness, then, marks him out as the figure that encompasses the model of the hero that embraces everyday acts of bravery and kindness. Paralleled to Harry throughout the narrative, Rowling's text uses Neville to compliment and expand on the idea of the hero by insisting it can also manifest in and from the "everyman."

Allyson Hubbell '17
Hometown: Carson City, MI • Major: English
Faculty Sponsor: Dr. Laura von Wallmenich

Consciousness and Subjectivity

In "What Is It Like to Be a Bat?" Thomas Nagel famously asserted that conscious experiences are subjective insofar as we are only capable of knowing what it is like to be another organism if we possess a perceptual apparatus similar to said organism. In other words, we are incapable of knowing what it is like to be a bat owing to our inability to use echolocation and so on. Here, however, I argue that Nagel's formulation of the subjectivity of conscious experiences is inadequate. Where Nagel's view of subjectivity allows for organisms that have the same perceptual apparatus to know the what-it-is-likeness of one another, I propose an alternative view that restricts subjectivity to the individual conscious experiencer. That is, on my offered alternative rendering of subjectivity, two individual organisms with an identical perceptual apparatus — even two humans — cannot know the what-it-is-likeness of the other. As such, it follows that subjectivity should not be relative to those with a particular perceptual apparatus, but relative to the individual.

Charles Oswald '17
Hometown: St. Louis, MI • Major: Philosophy
Faculty Sponsor: Dr. Nicholas Dixon

Perceptions of Sexual Education in Alma College First-Year Students

Sexual education is an important part of adolescent health. However, there is limited information on perceived knowledge of sexual education for first year college students in Michigan. Therefore, I conducted a study that examined the relationship between demographic information and perceived knowledge of sexual education using Alma College first year students. In October 2016, a survey was administered to first year students with over 100 students participating representing the various regions of Michigan. Various demographic variables influenced different components of perceived sexual education and knowledge. This study provides information that can be useful for the college, Wilcox Medical Center on campus, and the local community.

Logan Thiel '17
Hometown: Allegan, MI
Major: Health Care Administration
Faculty Sponsor: Dr. Amanda Harwood

Attachment and Adult Romantic Relationships

In the present study, researchers will examine the relationship between attachment security in romantic relationships and conflict resolution, caregiving style and relationship satisfaction. Participants will consist of adults who are part of the Alma and Alma College community and will be recruited via list serves and social media. The study will be entirely online via a Google Form. After agreeing to the informed consent, participants will complete six questionnaires consisting of the Experiences in Close Relationships Inventory along with the Experiences in Close Relationships-Revised Scale, Adverse Childhood Experiences Scale, Parent-Child Conflict Tactic Scale, Rahim Organizational Conflict Inventory, Caregiving Questionnaire, and the Couple's Satisfaction Index. Participants will then be debriefed via email about the hypothesis of the study and the findings, as well as answering any questions. The factors examined in the present study have not yet been examined together and will therefore improve validity and generalizability of established bivariate relationships by extending our understanding of how these variables interact with each other to predict romantic relationship quality. The knowledge to be gained from this project will provide a deeper understanding of how these factors contribute to healthy romantic relationships and may be useful to future intervention work designed to improve relationship quality.

Morgan Pell '17
Hometown: East Sandwich, MA • Major: Psychology
Faculty Sponsor: Dr. Brandi Stupica

Generational Trends in Advertising Preferences in Relation to Gender

The study investigated the relationship between participants' gender, generation and preferences in advertisements. Male and female participants indicated their age, sex and sexual orientation on a demographic survey. On an online survey, participants were shown advertisements categorized as masculine, feminine, or both masculine and feminine. They were asked to rate their likelihood to purchase the products being advertised based on the ad. The data was recorded and analyzed to investigate the trends of participants' preferences of advertisements. The purpose of the study was to determine if advertisements directed specifically to men or women are effective with audiences, in particular when comparing the millennial generation's preferences in ads to that of older generations.

Mairi Clow '17
Hometown: Shelby Township, MI
Majors: Psychology, Communication
Faculty Sponsor: Dr. Janie Diels

What Differences Exist in LE Measures of Strength, Power and Agility in non-ACL Injury and ACL Injury in Division III Female College Athlete Populations at Min. Six-month RTP?

The study's purpose measures lower extremity values of strength, power and agility in Division III female athletes who previously engaged in ACL reconstructive surgery. Subjects have maintained return to play clearance from the reconstruction for a minimum period of six months and are compared to Division III female collegiate athletes who have not sustained prior knee injuries. Following injury, the goal is to return to play at the same level previously achieved prior to the injury. Researchers of the current inquiry quantitatively measure three unique aspects of fitness: power, strength and agility. Each subject will complete testing in accordance with the aforementioned aspects. Subjects meeting the specific ACL criteria will be recruited from Alma College women's sports teams as will an equal number of control subjects. Control subjects will be recruited based on characteristics of the test subjects, tested, and finally compared to the ACL subject counterparts in all prescribed measures of fitness.

Celeste Boyer '17
Hometown: South Lyon, MI • Major: Athletic Training

Erin Lee '18
Hometown: Commerce Township, MI
Major: Undecided
Faculty Sponsor: Mr. Phillip Andre

The Effects of a Concussion on Visual Tracking, Balance and Symptoms in Division III Collegiate Athletes

This study was designed to test ocular muscle movement as well as vestibular function in Division III collegiate athletes that suffered a concussion. The return to play is the most vexing question asked after any athlete has suffered a concussion. Subjective and qualitative data present challenges when determining if the athlete is actually ready to return. Thus, utilizing quantitative data in conjunction with qualitative data presents a potential gold standard. After approval, case subjects from various Alma College athletic teams were recruited following a diagnosed concussion. Subjects were asked to complete a graded symptoms checklist upon arrival for each testing session. Subjects were tested while showing symptoms every day until they were asymptomatic and then again three months post-initial injury date. The BioPac Electrooculogram allowed principle researchers to gather quantitative data while the cases were asked to perform a visual task while maintaining balance, using three stances from the Balance Error Scoring System (BESS). The BioPac data was analyzed and interpreted using mean, linear regression, and minimum/maximum values and later compared to their post-test data.

Miranda Kruse '17
Hometown: Ann Arbor, MI • Major: Athletic Training
Faculty Sponsor: Mr. Phillip Andre

Physiological and Psychological Aspects of Sports Performance Stress

Athletic competition requires both physiological and psychological capabilities. During a soccer game, individuals are constantly moving while changing speed and direction for 90 minutes. Players have been observed and recorded during these games to run over an average of seven miles a game, depending on the player's position. Soccer requires not only great physiological condition, but the game is also mentally straining as well. To the best of our knowledge most studies strictly look at pre-performance aspects regarding physiological parameters as well as pre-performance anxiety. However, the relationship between physiological and psychological parameters during a stressful situation has not been explored. The purpose of this study was to determine the relationship between physiological and psychological responses that occur during a soccer competition or practice. Eight female collegiate athletes, competing on the Alma College women's soccer team, participated in this study. Subjects had their heart rate and cadence monitored using a shirt containing physiological sensors (Hexoskin) during a competitive game and a simulated stressor during practice. In addition, each subject completed a survey to categorize their state of mental toughness prior to the simulated stressor. Heart rates were the highest in the midfielders, whereas distance run was greatest in the forwards. Toughness surveys indicated that participants in this study were similar to other athletes from a wide variety of sports. Heart rate and mental toughness were not correlated for any of the subjects indicating that physiological and psychological parameters were unrelated in this group.

Macayla Greiner '17
Hometown: Hart, MI
Major: Integrative Physiology and Health Science

Jessica Burg '17
Hometown: Grand Ledge, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. John Davis

La Femme Nouvelle: The Development of Female Identity in Late 19th-Century French Painting

Art history today tends to categorize the oeuvres of late 19th century female artists as merely visual records of the private sphere — the female domain — that celebrate the joys of motherhood and marriage. However, to say that women artists were simply the visual documenters of the domestic life neglects to consider the development of female identities outside the circumscription of the male gaze and ignores the inevitable shift in power that occurs when a female artists wields the brush and controls the direction of the gaze. This one-dimensional role assigned to 19th century women artists must be expanded upon and include the alternative identities of women, which took root following the July Monarchy. I categorize the most prominent female identities into three archetypal groups — the ideal woman, the prostitute, and the intellectual woman — and I evaluate the artistic expression of these archetypes to understand, not just the male concept of female, but women's understanding of self-creation outside of the sea of social stigma and the historical dominance of the male gaze. These archetypes fundamentally change our understanding of the 19th century woman as she began to consider herself beyond socially proscribed stations and assumed the power of the gaze.

Hannah Hilditch '17
Hometown: White Lake, MI • Major: POE
Faculty Sponsor: Dr. Daniel Connolly

Tadeusz Kościuszko's Political Ideals and Their Historical Development c. 1770-1800

This presentation will focus on the political ideals of Tadeusz Kościuszko and their historical development. The international hero was raised in 18th-century Poland, a time infamous for the Partitions of Poland by Prussia, Russia, and Austria. In his youth, Kościuszko studied in France during the Enlightenment and read different works by French philosophers about authority and liberty. Years later, he traveled to America and became a military engineer in the Revolution where he helped secure West Point from the British. After the war, Kościuszko returned to Poland and worked with important Polish activists. With growing animosity among the people concerning the control Catherine II of Russia had over Poland, Kościuszko led an uprising against despotism which resulted in the Third Partition of Poland. Having many experiences from different regions around the world, it is unclear exactly how Kościuszko's political ideals developed. Though historians believe he gathered inspiration from each — France, America, and Poland — my research suggests that his homeland exerted the greatest influence on him. By examining primary sources from America and translated documents from France and Poland, along with secondary sources, the research will ultimately identify the region with the most influence on Kościuszko.

Mackenzie Kalisiewicz '17
Hometown: Warren, MI • Major: History
Faculty Sponsor: Dr. Daniel Wasserman

Using Tenax Extractable Concentrations to Predict Mortality

It is well understood that the traditional methods for predicting sediment toxicity of hydrophobic organics are not accurate as they do not consider bioavailability. Therefore, research has focused on techniques taking bioavailability into consideration, including Tenax extractable concentrations. Since Tenax extractable concentrations correlate to bioavailabilty, quantified as bioaccumulation, they should also be able to predict toxicity. However, to fully develop benchmarks based on Tenax extractable concentrations would require extensive time and resources. In the current study, Tenax extractable concentrations, mortality data, and

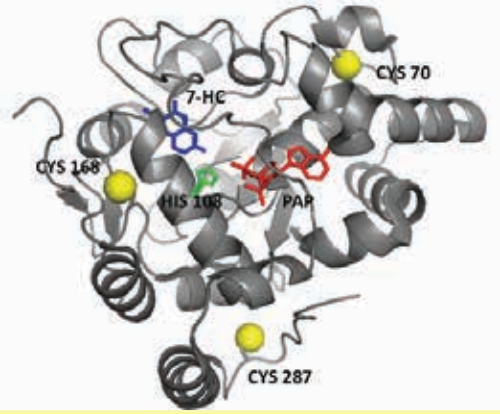
Marie Antoinette: Reinventing the Image of a Queen

Marie Antoinette's image as Queen of France deviated from previous modes of depiction. Earlier portraits of Queens of France were always to be paired with the King's portrait, complete with proper French fashions of the court, and a stiffness to express the stability of the monarchy. Portraits of Marie Antoinette by Madame Elisabeth Vigée-Le Brun highlight how the artist and patron worked together to reinvent the image of the Queen of France. Miniature portraits of the Queen also worked to reinvent an intimate view of the queen. Court portraits showed Marie Antoinette as an idealized image yet the miniature portraits made her a tangible object of status and currency in the hands her courtiers. Beginning her life as an Archduchess of Austria, Marie Antoinette attempted to please the French people, with the patronage of portraits that embodied the ideals of womanhood – in her own way. This paper explores how Marie Antoinette's Austrian heritage influenced her portraiture, ideas of portraiture as public appearance, and the female agency behind Marie Antoinette as a patron.

Elizabeth Webb '17
Hometown: New River, AZ
Major: English
Faculty Sponsor: Dr. Daniel Connolly

Structural and Functional Studies of a SULT1A1 With Serine Replacements of All Cysteine Residues

Cytosolic phenol sulfotransferases (SULT1A1) participate in drug and pollutant metabolism. The three cysteines (Cs) of bovine SULT1A1 have different binding reactivities to heavy metals, CoA, and oxygen. Mutagenesis has replaced each C with serine (S). The current project evaluates the activities, stabilities, ligand affinities, reactivities and oxygen sensitivities of these new SULTs. Purified single, double, and triple C##S mutant enzymes all exhibit usual homodimeric structure and catalytic activity. Whereas the wild type SULT1A1 is reactive with Ellman's reagent, the C[70,168,287]S mutant is non-reactive as expected. Furthermore, wild type activity is impaired by this reagent, but was without effect on the cysteine-free mutant. Differential scanning fluorimetry (DSF) revealed that C70S and C287S have little effect on SULT1A1 thermal stabilities. However, C168S decreases the Tm values from 53.4°C to 49.7°C independent of co-mutation context. Despite this effect, all enzymes exhibit a 13-14°C increase of Tm upon binding the ligands PAP and pentachlorophenol (PCP). After two weeks of exposure to oxygen, enzyme activities were measured. Whereas the wild type lost activity, the triple mutant resisted oxidation. SDS-PAGE of these reactions revealed intrasubunit disulfide bond formation in the wild type SULT. Experiments underway will determine the sensitivities of these enzymes to glutathione and Zn(II).



Heidi Michael '17
Hometown: Oak Park, MI • Major: Biochemistry
Alexander Hall '17
Hometown: Greenville, MI • Major: Biochemistry
Faculty Sponsor: Dr. Joe Beckmann

water quality benchmarks were used to create a model that relates Tenax extractable concentrations to mortality. This model will allow for the use of Tenax to more accurately predict toxicity without extensive method development.

Nicole Green '17
Hometown: Portland, MI
Majors: Mathematics, Environmental Studies
Faculty Sponsor: Dr. Amanda Harwood

Patterns in Distribution Among Winter Foraging Areas in the American Kestrel (*Falco sparverius*)

Many raptors hold winter territories in order to secure food resources. The American Kestrel (*Falco sparverius*) is no exception. While much research has focused on territories in the southern U.S., little is known about the winter territoriality of kestrels in more northern latitudes and specifically in central Michigan, which represents the northern limit of the winter range for this species. Information on the distances between individual winter foraging areas are poorly understood. This study is part of an ongoing project to determine the behavioral characteristics exhibited by kestrels wintering in central Michigan. Kestrels were captured, banded, measured, tagged with radio transmitters and monitored from the beginning of January through March. Daily movements, location and foraging area were recorded for radio-tagged individuals. The data is being analyzed to draw conclusions about these characteristics for central Michigan's kestrel populations.

Krista Botting '17
Hometown: Ionia, MI • Major: Biology
Amber Tuttle '17
Hometown: Kalamazoo, MI • Major: Biology
Savanah Warners '18
Hometown: Morley, MI • Majors: Biology, English
Sarah Garrod '20
Hometown: Haslett, MI • Major: Undecided
Faculty Sponsor: Mr. Michael Bishop

Poetics: On Nature

This presentation will explore the power of poetry from the perspective of one particular poet: the presenter. Specifically, the poems read will center on the theme of nature, both that of the world and of people. One of the main focuses will be the idea of how some of the larger revelations regarding these natures, not to mention great beauty, can be discovered through a close examination of smaller things.

Michaela Hoyle '17
Hometown: Breckenridge, MI • Major: English
Faculty Sponsor: Dr. William Palmer

An Ethnographic Analogy of Elephant Hunting

This research is an ethnographic analogy of elephant hunting which has then been applied to prehistoric mastodon hunting. Mastodons went extinct at the end of the Pleistocene 10,000 years ago. When discussing mastodon hunting it is common to associate atlatls and spears as the common tools used. These methods have been archaeological and experimentally proven. However, the ethnographic evidence from 11 tribes in Africa suggests the possible use of spear pits as the main tool for hunting elephants. Half of the 11 tribes that were researched used spear pits as the tool used to hunt elephants, 22% used spears, 11% used weighted spears, and 17% used other tools such as clubs or bows. This evidence can lead anthropologists to look for spear pit sites or interpret other sites.

Ashleigh Strand '17
Hometown: St. Charles, MI • Major: Anthropology
Faculty Sponsor: Dr. Megan McCullen

Relationship of Physical Activity and Sleep Quality in College Students

Most adults do not achieve the recommended eight hours/night of sleep. Because of this, researchers have monitored sleep and attempted to increase quality and quantity by changing some aspect of a person's lifestyle. In this particular study, college students will be asked to change their level of physical activity and see how sleep is influenced. Most college students report having a poor sleep schedule which could be due to students being under high levels of stress due to academics, financial stability, and self-sustainability. This research will focus on monitoring college students' sleep and physical activity levels using a Misfit Flash activity tracker worn on the non-dominant wrist. During the three-week study, subjects will perform their normal tasks for weeks one and three but increase their level of physical activity (daily steps taken) by 25% for week two. The primary goal of this research is to observe the relationship between sleep quality/quantity and physical activity. If a positive relationship is found, this finding could be used to motivate college students to engage in more physically

activity lifestyles that could improve both their mental and physical wellbeing as well as their sleep quality and quantity.

Lindsay Giannotta '17
Hometown: St. Clair Shores, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Alexander Montoye

Balance and Neuromuscular Control as Predictors of Anterior Cruciate Ligament Injury Risk

Anterior cruciate ligament injury, as well as other ligamentous knee injuries, are a problem that plagues many young athletes. This problem creates an urgency to determine what factors cause ACL tears so in the future, actions can be taken to decrease the incidence rate of these injuries. Research has shown that individuals that have previously ruptured the ACL have poorer balance (Vrbanic et al 2007). What is not yet understood is whether balance is poor following ACL recovery or if poor balance leads to ACL injury. The purpose of this study was to examine the balance of ACL ruptured individuals in both the affected and non-affected legs and in individuals that have never injured the ACL. Participants performed three separate tasks during the study. Individuals balanced on one leg on top of a force transducer for 30sec, they did this both with the eyes open and eyes closed in a counterbalanced order. Participants performed a single leg knee flexion over a 10sec time frame, and individuals jumped down onto the force plate from a 32cm box and then jumped as high as possible. Ground force reactions were collected and analyzed as well as knee flexions and extensions.

Kaitlyn Urick '17
Hometown: Glen Ellyn, IL
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Christopher Aiken

The Effects of Visual Training on Free Throw Accuracy

Visual feedback is the predominant sensory information that we use when learning a novel motor skill. Quiet Eye (QE) training teaches individuals to focus their gaze on a task specific aspect of the performance. QE has been shown to enhance performance in a variety of sport specific skills. One area in the QE literature that has not received attention is the relation of QE to disrupted visual feedback in a basketball free throw. The purpose of this study is therefore to determine the effects of QE training on free throw accuracy in females when having minimal time to focus their visual gaze. Participants performed a pre-test of free throw shooting and then trained with the QE technique. Approximately 24 hours following training the participants performed a free throw post-test. Participants consisted of both female basketball players and female non basketball players. It is anticipated that participants will have better accuracy during the post-test and that basketball players will perform better than non-basketball players.

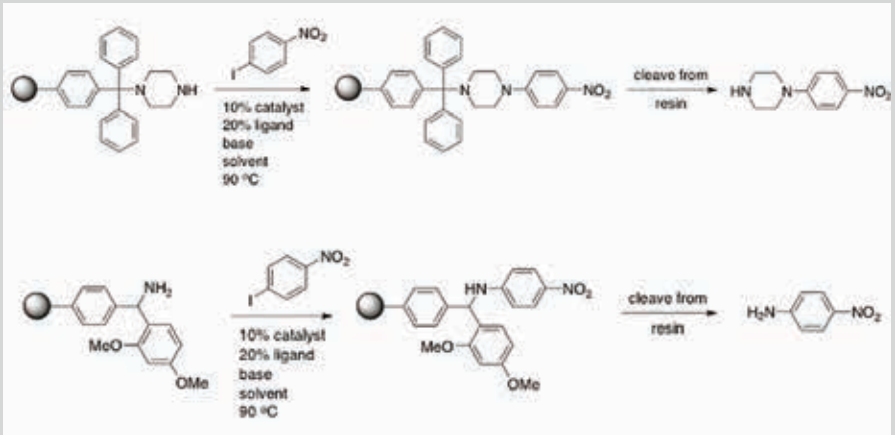
Kaitlyn Kendall '17
Hometown: Farmington Hills, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Christopher Aiken

The Effects of Self-Control on the Learning of a Graphical Aiming Task

Research has shown that allowing control over some aspect of the learning environment facilitates learning (Wulf, 2007). However, literature has yet to examine the effects of learner controlled feedback on graphical aiming tasks. Our purpose was to investigate the effects of self controlled (SC) feedback on the learning of a timed graphical aiming task. Study 1: Individuals practiced 60 trials of an aiming task (ACQ). Half the participants controlled the amount of feedback (SC) and half were yoked to the SC (YK). Twenty-four hours later they performed six retention and transfer trials to assess learning. Results suggest that both groups improved throughout ACQ ($p<.05$). However, no significant differences between groups were observed. These results are contrary to the existing literature so we performed a second experiment with different equipment to continue examining our purpose. Study 2: Participants practiced a modified graphical aiming task with a Cintiqu tablet and returned the following day for retention and transfer. Once again, individuals improved during practice ($p<.05$) but no group differences were observed. SC did not facilitate learning in either of the studies. These results are contrary to the typical findings in SC literature and need to be further investigated.

Solid-Phase Buchwald-Hartwig Reactions

Amines bound to aromatic rings are found in many medications; including current clinically-approved drugs for human influenza. In the process of our synthetic efforts, we learned that cross coupling amines with aromatic halides in the solution-phase required significant purification efforts. Purification is greatly simplified by utilizing amines bound to solid support. The use of solid-supported synthetic building blocks can also facilitate the synthesis of a large library of products with minimal effort. Various conditions can be used in Buchwald-Hartwig cross coupling reactions of resin-bound primary and secondary amines with aromatic halides. Changes in the solvent, base, palladium catalyst source, and ligand used can all influence product yield. The scope of aromatic structures used has also been tested to explore the applications of solid-phase Buchwald-Hartwig reactions with amines.



Andrew Rajewski '18
Hometown: Auburn, MI • Major: Chemistry
Matthew Embury '18
Hometown: Grand Rapids, MI • Major: Biochemistry
Faculty Sponsor: Dr. Jeffrey Turk

ABSTRACTS: CONCURRENT SESSION V

Benjamin Luzar '18
Hometown: Midland, MI
Major: Integrative Physiology and Health Science

Laura Cameron '19
Hometown: Battle Creek, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. Christopher Aiken

Differences in VO_2 max and Heart Rate Between Division III Collegiate Volleyball and Softball Players as Determined by Arm Ergometer Testing

Research regarding VO_2 max in Division III collegiate volleyball and softball players is limited. Skinner has previously noted the differences existing between different sports groups. He discussed general principles of exercise training and prescription including differences between men and women, yet in certain instances, there still exists literary gaps and contradictions that leave unresolved questions regarding the capacities of different groups. The purpose of this study is to determine the differences in VO_2 max and heart rate between Division III collegiate volleyball and softball players using an arm ergometer test. Subjects from the volleyball and softball teams will participate. Subjects will complete a questionnaire concerning general background information, position played, and other information regarding past shoulder injuries. Qualified subjects will then utilize the arm ergometer for testing. The results and ensuing discussion will showcase comparisons between the two groups as well as potential implications.

Trisha Reed '17
Hometown: Alma, MI • Major: Athletic Training
Faculty Sponsor: Mr. Phillip Andre

Effects of Low, Moderate, and High Intensity Exercise Training Programs on Cardiac Function

To our knowledge, previous studies have not taken into account the impact of implementing varying intensity exercise regimens and the role exercise intensity plays on influencing the regulation of heart rate and blood pressure. Purpose: Thus our study aims to investigate differing levels of exercise intensity that contribute to the physiological adaptations associated with cardiac function and to further determine the most efficient training regimen to improve cardiac health. Methods: Twenty-eight males and females aged 18-35 were assessed for electrocardiogram, beat-to-beat blood pressure, aerobic capacity, and muscle strength before, during and after an eight-week training regimen. The low intensity training regimen consisted of three sets of 10 reps for a variety of upper body and lower body exercises. The moderate intensity training regimen consisted of walking or jogging at 40-60% of each subject's maximum heart rate. The vigorous intensity training regimen consisted of running at 60-90% percent of each subject's maximum heart rate. All training regimens were completed three days per week for eight weeks. All of the measurements with the exception of aerobic capacity and muscle strength were conducted again at the midterm of the study. The same baseline testing from prior to the study was completed at the end of the eight week study. Results: A direct, positively correlated relationship between exercise intensity and improvement in measurements of cardiac function will be established based on the results of this study. These findings will be important for future exercise prescription in sedentary individuals who want to improve overall cardiac health.

Maressa Miller '17
Hometown: Grand Blanc, MI
Major: Integrative Physiology and Health Science

Jacqueline Vyskocil '17
Hometown: Linden, MI
Major: Integrative Physiology and Health Science
Faculty Sponsor: Dr. John Davis

ABSTRACTS: CONCURRENT SESSION V — POSTERS

Modulation of CYP1A1 Induction Due to Cigarette Smoke in Bronchial Epithelial Cells

Cigarette smoking is a major risk factor for lung cancer, and the bronchial epithelium is a primary site for carcinogenesis. Some compounds in smoke are enzymatically-activated to carcinogens by members of the cytochrome P-450 (CYP) family, and CYP genes can be induced by chemical exposures. CYP gene induction is mediated by the aryl-hydrocarbon receptor (AhR) which binds some compounds in smoke such as benzo[a]pyrene (BaP) and nicotine. Thus, exposure to these compounds creates a positive feedback loop for the generation of carcinogens. This study is intended to discover compounds that interfere with the AhR transcription pathway and thus mitigate the CYP1A1 induction. The human bronchial epithelial cell line, BEAS-2B, was exposed to varied doses and durations of cigarette smoke extract (CSE) followed by RNA extraction. Both standard and qRT-PCR demonstrated reversible induction of CYP1A1 transcripts. Numerous compounds and hormones were then chosen as candidates to disrupt CYP1A1 induction, the effects of which were first determined without CSE exposure. Epidermal Growth Factor (EGF), retinoic acid (RA), db-cAMP, and TGF-beta lowered CYP1A1 expression, and these were therefore considered for co-exposure experiments. Preliminary results indicate that RA partially impedes the CSE induction of CYP1A1 expression. Further dose-response and time-course experiments are in progress.

Nicholas Arnold '17
Hometown: Reese, MI
Majors: Business Administration, Biology
Faculty Sponsor: Dr. Joe Beckmann

Analysis of Captive Turtle Skin Surface Bacteria With Implications for Skin Permeability

Both wild and captive turtles are wildly known for containing a large array of bacteria on their skin (McCoy and Seidler 1972, Aguirre et al. 1993, Marin et al. 2013, Basler et al. 2015). By first making assays of the bacterial growth on captive turtle skin, I will be able to quantify the number of bacterial colonies growing on a turtle's skin, and compare this to human skin bacterial growth. After quantifying the bacterial growth and analyzing the skin I will be able to use this information to infer the permeability of the turtle's skin, as compared to humans to show how much of the bacteria on a turtle's skin stays on the surface, while these same types of bacteria are known to cause illnesses in humans (Kuroki et al. 2015). The large number of bacteria on the turtle's skin likely creates another layer of protection over the turtle's body (Matoltsy 2004). Using this information, I will infer and discuss the implications that the bacterial growth may play in a turtle's daily life. The bacterial coating both protects the turtle by making an extra layer, but it also demonstrates the likelihood of the skin allowing other pathogens or bacteria to infect the turtle. This can further be applied to the way turtles avoid other illnesses including decompression sickness, which should be widely prevalent in turtles (Dell'Amore 2011, Palmer 2015)

Lauren Kucharczyk '19
Hometown: Livonia, MI • Major: Biology
Faculty Sponsors: Dr. John Rowe, Dr. Timothy Keeton

In vivo Visualization of Cortical Porosity Development in an Animal Model of Progressive Chronic Kidney Disease

Dorothy Buening '18
Hometown: Pinckney, MI • Major: Biochemistry
Faculty Sponsor: Dr. John Davis

The effects of chronic kidney disease (CKD) on bone composition and structure is of interest due to increased skeletal fracture risk observed in CKD patients. The Cy/+ rat model of progressive polycystic kidney disease closely mimics the bone changes observed in patients with CKD. Previous studies showed an increase of cortical porosity in 35-week-old Cy/+ rats, but the porosity's onset and rate of progression were unknown. This study tested the feasibility of tracking the progression of CKD-related bone porosity using longitudinal in vivo micro-computed tomography (microCT) scans. MicroCT bone images of normal and Cy/+ rats were collected at 25, 30 and 35 weeks of age in order to visualize and quantify developing porosity. A 1 mm volume of interest distal to the tibia-fibula junction was chosen for analysis. Scans throughout the study were 3D registered allowing for a means to analyze the same locations and porosity patterns. Cortical bone loss occurred throughout the duration of the study with the majority occurring between 30 and 35 weeks (Table 1). In vivo microCT has been successfully applied to monitor progressive bone loss in a CKD rat model, revealing that porosity previously observed appears suddenly then increases rapidly after 30 weeks of age.

Table 1. Cortical Porosity of the Distal Tibia

Time	Phenotype	Count	Mean Porosity (%)	Standard Deviation	Coefficient of Variation
25 weeks	CKD	10	0.42	0.29	69.4%
	Normal	8	0.40	0.26	66.3%
30 weeks	CKD	11	0.50	0.47	92.9%
	Normal	16	0.36	0.15	43.2%
35 weeks	CKD	13	2.51	3.24	128.8%
	Normal	18	0.23	0.08	36.6%

Detection of Polyphenolic Compounds in Crude Extract Samples of Strawberry Cultivars

Strawberries have been studied for their flavonoid content due to their high antioxidant capabilities. The flavonoid content may differ between cultivars and in this research the strawberry cultivars Jewel, Cavendish, L'Amour and AC Valley Sunset were studied. The total flavonoid content versus rutin trihydrate of whole strawberries was determined using UV-visible spectroscopy for three of the cultivars. The results showed no statistical difference between cultivars and no statistical difference on pick day compared to after freezing for three weeks. Further analysis to identify polyphenolic compounds from crude acetone extracts of the freeze-dried strawberries utilized matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). In all four cultivars, homogenous oligomerization of (epi)catechin was detected. Signals for dimers through hexamers of (epi)catechin oligomers were observed as sodiated and potassiated oligomers. Cation identification was confirmed by mass changes due to the addition of cesium salt resulting in cesiated oligomers.

Chelse Van Spronsen '18
Hometown: Jenison, MI • Major: Biology
Faculty Sponsor: Dr. Nancy Dopke

The Real Life CSI: An Introductory Investigation Into Forensic Science

An analysis of the methods and instrumentation used in forensic science with a focus on the examination and identification of drugs was conducted. Household medications as well as the chemical equivalent of synthetic drugs were used. TLC was used to compare the Rf values of controls to the Rf values of household drugs to determine which of the controls were a main ingredient in the drugs. Controls tested were chemical grade acetaminophen, aspirin, caffeine and ibuprofen. The Rf values of those tested matched that of their control ingredients with the exception of the ibuprofen tablet whose Rf value corresponded to aspirin. A presumptive drug analysis was done by color spot testing using three separate reagents: Scott, Mandelin and Marquis. The Scott reagent didn't cause any reactions with any of the drug specimens tested but since the only drugs tested that should have reacted were chemical equivalents, the lack of reactions is plausible. The drug specimens that reacted with both the Marquis and the Mandelin reagent were all re-tested and led to a correct identification. Lastly, IR spectroscopy was used to identify unknown solutions. Each unknown compound was analyzed using IR and their spectrum was compared to that of the controls to determine their composition. Through this analysis it was concluded that TLC, presumptive testing — such as color spotting — and IR are all reasonable ways to determine the identification of drugs. Continued research will involve using GC/MS to further analyze drugs, reagents to test for blood presence, and microscopy to identify polymers, fibers and hairs.

Naria Ford-Thompson '18
Hometown: Gwinn, MI • Major: Chemistry
Faculty Sponsor: Dr. Melissa Strait

Investigation of Particle Movement After Disruption

Models have been constructed to mirror the disruption of meteorites in order to understand their fragmentation patterns, but there is still room for improvement. Video images of disruption events of various meteorites are taken with high-speed cameras at the NASA Ames Vertical Gun Range. In the program ImageJ, the video files are used to track and analyze the path of each particle in relation to the detectors. The frame rate of the camera and the ImageJ distance tool are used to determine particle size and velocity. Video files from 11 different shots were analyzed. Particle size ranged from 4.189 x 10-6 to 14.933 mm3, while particle velocity ranged from 4.381 to 150.563 m/s. The first wave of particles that pass through the detectors are always some of the smallest; however, there are still a number of very small particles

that travel slowly. The bigger particles seen usually travel much slower, averaging somewhere between 10 and 20 m/s. Moving forward, particle size will be more accurately measured using a scanner and CyberViewX, then compared to their respective velocities. This will permit the development of conclusions that can be passed along for the improvement of meteorite disruption models.

Warren Elmer '18
Hometown: Midland, MI • Majors: Integrative Physiology and Health Science, Spanish
Faculty Sponsor: Dr. Melissa Strait

Investigation of Drug Cutting Agents

Many substances have been used to "cut" or combine with drugs to dull or heighten the effects of the drug. A set of possible cutting agents will be analyzed and their identifiable properties recorded. Using High Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography (TLC). Cutting agents, such as mannitol, inositol, sucrose, caffeine, and baking powder will be mixed with aspirin, as a model drug, and the instrumentation will be used to characterize the samples. TLC will be used to initially identify substances present. HPLC will be used to further examine the substances and to quantify the samples. Identifiable markers are used throughout forensic toxicology to determine what is in an unknown substance found at a crime scene, as well as from who or where the drugs came.

Jackson Conner '18
Hometown: Hopkins, MI • Major: Biochemistry
Faculty Sponsor: Dr. Melissa Strait

Porosity Adjustments of Carbonaceous Chondrite Analogs

Access to carbonaceous chondrites is difficult due to their rare nature, therefore this project has embarked on a project to create carbonaceous chondrite analogs. The main problem that arises when these analogs are created is their density. The artificial samples have a density of roughly 2.0 g/cm3, whereas the density of natural carbonaceous chondrites is 1.6 g/cm3. A series of five experiments were designed to increase the porosity of the samples. By increasing the porosity, the density decreases. Two control samples were also included for comparison. The experiments were designed to adjust the density of the samples without chemically altering them. The average density of the control samples was 1.92 g/cm3 ± 0.04 g/cm3. Most of the experiments yielded no significant adjustment to the density of the samples. The experiments where the particle sizes were adjusted yielded a substantial change to the density. The sample that used larger particles had a 6.77% decrease in density from the control average. The sample that used smaller particles had a 26.04% decrease in density from the control average. Further experiments will be done to validate this result.

Spenser Congram '18
Hometown: Indianapolis, IN
Majors: Physics, Chemistry
Faculty Sponsor: Dr. Melissa Strait

Do Fitbit Monitors Use Heart Rate When Determining Caloric Expenditure?

PURPOSE: To determine if the Fitbit Charge HR monitor uses heart rate (HR) when estimating calories (kcals). METHODS: Data from two studies were used. In Study 1, participants (n=16) performed stationary cycling and lying down for five minutes each while wearing a Fitbit Flex (measures steps and kcals but not HR) and metabolic analyzer (kcal criterion). In Study 2, participants (n=32) performed cycling and lying down while wearing a Fitbit Charge HR and metabolic analyzer. Cycling and lying down were chosen because they elicit little wrist movement but are different intensities (i.e., should have different HR). Paired t-tests were used to determine if significant differences existed between measured and predicted kcals. RESULTS: In Study 1, the Flex underestimated kcals compared to the criterion for lying down (6.6±1.4 vs. 7.4±1.8, p+0.02) and cycling (17.0±7.6 vs. 30.1±10.4, p<0.001). In study 2, the Charge HR kcal predictions were not different from the criterion for lying down (9.0±7.1 vs. 7.5±1.0, p=0.15) or cycling (41.3±15.4 vs. 37.4±6.8, p=0.23). CONCLUSION: The Fitbit Charge HR, appears to use HR when calculating kcals. However, kcal estimates between devices using HR and not using HR will not be comparable because they use different algorithms.

Matthew Wiersma '18
Hometown: St. Johns, MI • Major: Athletic Training
Faculty Sponsor: Dr. Alexander Montoye

Comparability of Physical Activity Estimates of Fitbit Monitors Worn on Different Body Locations

Fitbit, a popular physical activity (PA) monitoring device brand, claims that its products can be worn on multiple body locations to record PA. Purpose: To compare the PA estimates of Fitbit monitors worn on both wrists and the right hip. Methods: Thirty-two participants 18-28 years of age wore three Fitbit monitors, one on each wrist (Fitbit Flex) and one on the hip (Fitbit One). On Monday morning, subjects were given the Fitbits and were instructed to wear them 24 hours/day until Friday afternoon, at which time they were returned. The Fitbits recorded steps, calories and active minutes; repeated-measures ANOVA was used to compare PA estimates among the monitors. Results: The hip monitor recorded the less PA than both wrist monitors (P<0.05 for all variables), with daily averages of 8,976 steps, 2,410 calories, and 24.5 active minutes. The wrist monitors also had significantly different PA estimates from each other for each PA variable (P<0.05). The non-dominant wrist had estimates of 10,115 steps, 2,494 calories, and 28.9 active minutes, and the dominant wrist recorded averages of 9,777 steps, 2,465 calories, and 26.3 active minutes. Conclusion: Overall, the Fitbit monitors do not precisely monitor PA when worn on different body locations.

John Vusich '19
Perrinton, MI • Major: Undecided
Faculty Sponsor: Dr. Alexander Montoye

Fiji: Theirs or Ours — Considering Fiji's Economic and Social Standing

I would like to present on Fiji's economic, political and social standings in regards to the large amounts of Western tourism that persist within the islands. I will be investigating the effects of tourism in contrast with local cultures and people in hopes of finding whether or not traditional Fijian culture is threatened.

Bergen Jome '18
Hometown: Bloomington, IL • Major: History
Faculty Sponsor: Dr. Derick Hulme

Frequency of Relocations of American Kestrels Radio-Tagged Between 2009 and 2017

The American kestrel (*Falco sparverius*) is a small bird of prey with a year-round range that stretches from the center of Michigan's Lower Peninsula through North America and into Central and South America. In this study, radio tags were attached to individuals of this species and these tags were used to track and relocate the kestrels. We observed the ultimate fate of the birds being tracked by attempting to relocate the tagged birds several times a week. By doing so, we determined the number of kestrels that after being tagged and released, were never seen again, relocated consistently over the course of the study, or relocated and then lost.

Sarah Garrod '20
Hometown: Haslett, MI • Major: Undecided

Savanah Warners '18
Hometown: Morley, MI • Majors: Biology, English
Faculty Sponsor: Mr. Michael Bishop

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