

Celebration of **SCHOLARSHIP**



THURSDAY, APRIL 11, 2019

Oral Presentation Program

IWU'S ANNUAL UNDERGRADUATE RESEARCH CONFERENCE

SPONSORED BY THE JOHN WESLEY HONORS COLLEGE

ORAL PRESENTATION SCHEDULE

Presentations begin every 20 minutes in Bedford and Leedy Banquet Rooms in the Barnes Student Center. There will be a break for the Celebration of Scholarship Luncheon* from 12:00pm to 2:00pm.

**RSVP required*

	BEDFORD	LEEDY
8:20am	Emily Sheetz	
8:40am	Ben Palmer	
9:00am	Courtney Dunn	Alissa Houpt, Leah Lowery, Kirsten Collins, & Hannah Rufener
9:20am	Stacie Hintz	Kaylynn Ruger, Josh Gore, Marlena Cheney, & Hannah Rowley
9:40am	Laura Perkins	Ashley Coverly, Bethany Fletcher, & Brittney Hamrick
10:00am	Lauren Buckley	Jayde Guy & Jordan Peoples
10:20am	Rachael Van Huis	Megan Abbott
10:40am		Jenna Mogg, Emily Bosworth, Chloe Mackay, & Lindsey Violet
11:00am	Jill Koval	Taylor Bray, Abigail Degenhart, Grace Poole, & Emily Shafer
11:20am		Anna Frantz & Allen Beaujon
11:40am		

CELEBRATION OF SCHOLARSHIP LUNCHEON

2:00pm	Shannon Morrison	
2:20pm	Marissa O'Hair	
2:40pm	Julie Webster	Jeff Marshall, Johnny Rhodes, & Evan Wilcox
3:00pm	Benjamin Pettus	Hannah Bowman, Elise Hervey, Jazmin Morales, & Jaclyn VanCise
3:20pm	Jessie Dion	Abigail Manwell, Sydney Mella, & Matthew Rosser
3:40pm	Morgan Bounds	Christine O'Leary
4:00pm	Hannah Caringal	Ethan Blake
4:20pm	Leah Potts	Andrew Wantz
4:40pm	Rachel Johnson	

MORNING SESSIONS

8.20 AM

BEDFORD

Food Movement Curriculum: Raising Awareness of the American Food Industry

Emily Sheetz, *Theology & Ministry*

The purpose of this curriculum is to raise awareness of the American food industry. It addresses issues within the food justice movement, like food deserts, the impact of tax dollar and governmental support of factories, and the health of those who produce/harvest what we eat. It also asks what we can do about these issues. It is full of practical information that can be used in a variety of settings.

8.40 AM

BEDFORD

Patristic Theology for American United Methodism: Re-imagining Ministry with Unmarried Adults Through the Lens of St. John Chrysostom

Ben Palmer, *Theology & Ministry*

As American adults continue to marry later and less often, the United Methodist Church must confront how it can best serve this growing demographic. This project proposes that the theology of St. John Chrysostom offers a theological foundation for ministry which counteracts prevailing cultural deceptions and meets the needs of unmarried adults. Focusing on Chrysostom's understanding of ecclesiology, the Christian life, and chastity in both the married and unmarried contexts, this project will investigate how these theological concepts might inform effective ministry practices. After suggesting practices which arise from Chrysostom's theology, this project will analyze how such practices are being either implemented or neglected throughout American United Methodism.

9.00 AM

BEDFORD

A Rallying Cry: The Call for the Cultivation of a Culture of Normativity Amongst Women Preachers in The Wesleyan Church

Courtney Dunn, *Theology & Ministry*

Historically, The Wesleyan Church has held prominent positions and statements allowing women to participate in all areas of ministry, and, over time, there have been advancements toward increasing the number of women in ministry in the church. However, within the realm of women in ministry, one specific category and position has been lacking for women. The specific area that is still lacking in advancement is that of women in spiritual authority positions in the church, which includes but is not limited to, women preachers. This scholarship project seeks to discover the creation of a culture that tears down the implicit biases toward women in the church and allows for women to be able to fully minister and preach in all areas of The Wesleyan Church.

Correlation Between Relationship and Type of Abuse to Child Victims in Grant County

Alissa Houpt, Leah Lowery, Kirsten Collins, and Hannah Rufener, *Behavioral Sciences*

The maltreatment of children is a cause that is catching wind throughout the nation. As awareness is being spread, laws are being passed that allows victims to sue their abusers in various states. While child abuse is strongly present throughout the country, there are still many holes in research among the topic. The purpose of this quantitative research study is to explore the connection between perpetrators in relation to the type of abuse that is used against child victims. More specifically, the researchers hypothesize that there is a correlation between perpetrators inside the home as compared to outside in terms of the type of abuse used. In addition, it is theorized that there is a correlation regarding the relationship between the perpetrator and victim with the type of abuse that was reported. Existing data from 2004 to 2018 through First Light Child Advocacy Center, an agency serving children in Grant and surrounding counties in Indiana, will be the source of information analyzed. Results of this study will assist advocates and policy makers in establishing prevention strategies in combating child abuse. In addition, aftercare treatment for the victims and their families can be enhanced.

LEEDY

9.20 AM

More Than Just Good Intentions: Identifying the Marks of Effective Short-Term Youth Mission Trips

Stacie Hintz, *Theology & Ministry*

Short-term mission trips have become a staple in the world of youth ministry. Researchers estimate that nearly 1.5 million volunteers participate in short-term missions every year, and nearly thirty percent of North American teenagers have taken part in such trips. While volunteering, evangelism, and youth involvement tend to be elements that Christians support, recent research has led some Christians to question whether or not these trips are actually as beneficial as many believe that they are. It is important to understand that no church willingly sends a team of students to another country with the intention of harming that country or the ministry that has already been taking place there; however, some may argue that short-term missions do just that. If this is true, should the church continue to participate in and promote these trips? This research project investigates the biblical and theological foundations for short-term missions alongside their historical development and the cultural impacts they have on hosts and participants in order to identify the marks of effective short-term youth mission trips.

BEDFORD

Cultural Competency and Short Term Service Trips: A Study Evaluating the Effects of Intercultural Trips on Cultural Competency

Kaylynn Ruger, Josh Gore, Marlena Cheney, and Hannah Rowley, *Behavioral Sciences*

The purpose of this quantitative study is to discover if there is a change in cultural competency of college students currently enrolled within Christian Universities before and after they participate in an intercultural short-term service trip. Pre-test and post-test results of students participating in short term intercultural trips will be measured using the Cultural Competence Self Assessment Checklist developed by the Greater Vancouver Island Multicultural Society. The significance of this research is to determine if short term trips are an effective way to increase cultural competency and thus an effective way to use university resources. Current trends are pushing Christian universities towards

LEEDY

inclusive excellence which has resulted in a university charge to increase the cultural competency of students. The data will be gathered and assessed in Survey Monkey and the Statistical Package for the Social Sciences (SPSS). Our analysis instruments will determine if there is a significant difference between pre-test and post-test results. These findings will reveal greater knowledge regarding the effects of short-term intercultural experiences on student's cultural competency and can be used by educational and professional institutions to best achieve preferred cultural competency levels which have become a priority as diversity within the United States continues to rise.

9.40 AM

BEDFORD

A Lyrical Comparative Analysis of Aten Hymns and Mosaic Psalms

Laura Perkins, *Music*

This project will compare and contrast two Egyptian hymns written during the Amarna Period, the "Great Hymn to the Aten" and the "Short Hymn", with Psalm 90 and Exodus 15:1-21, psalms written by Moses. Within this comparison, the lyrics of the aforementioned psalm and hymns will be analyzed, specifically looking at the similarities and differences in the utilized imagery, structure, and language flow. The language involved in worship will also be compared, including the manner in which the Egyptian deities and God are invoked, whether by specific actions or by specific traits. This comparison will provide an indication of potential influence between the Israelites and the ancient Egyptians.

The two Egyptian hymns chosen for analysis are representatives of the cult of Aten, an Egyptian god who becomes more prominent in Egyptian records towards the end of the reign of the pharaoh Amenhotep III. These hymns were likely written by his son, Akhenaten (also known as Amenhotep IV). Hymns were selected from this particular cult because, though Aten is in essence an amalgamation of many Egyptian solar deities, his adherents considered him to have "Oneness." Thus, the cult of Aten provides an interesting contrast against the numerous deities worshipped in the cult of Amen-Ra, the prominent cult of ancient Egypt's history.

The psalms selected from Jewish literature, Psalm 90 and Exodus 15:1-21 were both written by Moses, the writer of the Pentateuch, an Israelite raised by the Egyptian royal family. Throughout his formative years, Moses would have experienced culture clash, as he probably was aware of his origins but was raised in isolation with the royal children. As he is a person who historically crossed boundaries between the Egyptians and Israelites, his writings are worth comparing to that of Egyptians.

Length of Institutional Care and Depression: A Study of the Elderly

Ashley Coverly, Bethany Fletcher, and Brittney Hamrick, *Behavioral Sciences*

Depression is a major social problem amongst a large portion of the United States. This issue affects all ages, especially the elderly who are in nursing home facilities. There is a growing number of elderly people in the US and the need for services for this population is growing as well. People in our communities scrutinize institutional care, however, more and more aging adults are placed in nursing homes. Depression, contrary to population belief, is not a normal part of aging. It can be caused, in part, by numerous aspects of life such as loneliness. Depression is a risk factor for suicide, and the elderly carry the highest suicide rates. The quantitative study seeks to understand to what extent a relationship is present between how long elderly have been receiving institutional care and their depression score as measured by the Geriatric Depression Scale-15. Elderly from in three different residential care facilities in Marion, Indiana consist of the sampling population. Results

LEEDY

from this study will allow for a greater understanding of the importance of social milieu within nursing home facilities. Nursing homes need to develop programs to meet the growing needs of their residents in all areas of life.

10.00 AM

BEDFORD

Hospitality, Belonging, and Design in the Neonatal Intensive Care

Lauren Buckley, *Nursing*

Various studies have determined that aspects of the design of the NICU are critical to the health of the infant and the experience of the patient's parents during their time in the environment. Elements such as room design, lighting, and sound all have an impact on both the baby's health and the experience of the family members, so each has an essential aspect in planning the NICU to enhance healing and comfort. Some elements, however, like comfortable furniture, will likely not have a direct impact on infant health, but they may encourage parent presence in the unit. When parents are present more often or feel welcome, they are more likely to learn how to care for their child properly and bond with the baby. Design features that do not seem to impact the health or wellbeing of the patient may very well be impactful in the long run. I will discuss the importance of NICU design in its impact on patients' parents, and I predict that units that more effectively welcome family members also have better outcomes in preparing the parents to take care of their child after discharge.

Voices in Belonging: A Phenomenological Study of African American Students at a Predominately Caucasian Christian University

Jayde Guy and Jordan Peoples, *Behavioral Sciences*

Christian universities are unique in their Christ centered commitment by integrating faith into a liberal arts higher education. It is through this calling that Christian universities desire to be inclusive of all persons seeking an education. Yet, the retention and graduation rates of minority students is considerably lower than that for Caucasian students. According to the National Center for Education Statistics (2017), the graduation rate for African American students was 43.5 percent, this is more than 26 percent below their Caucasian counterparts. This phenomenological study will explore the lived experiences of African American students on a predominantly Caucasian Christian campus. Specifically, students currently enrolled for at least one or more years will be interviewed in an effort to better understand their lived experiences throughout their tenure. The intention is to glean themes beginning with recruitment, admission process, first year, through current experiences in regards to belonging and adjustment. Through hearing the voices of students of color, universities will be able to implement new initiatives, revise policies, and create an environment where all feel welcome.

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Having hope when going through hell: personal accounts of the spiritual road to PTSD recovery

Rachael Van Huis, *Nursing*

Nursing school teachings the value of caring for a patient spiritually as well as physically. Although it is often a quality of care that is overlooked and put as a last priority, spiritual care has a profound impact on a patient's overall well-being, treatment, and recovery process. This study investigates firsthand accounts of the impact spirituality and religion has had on treatment for people diagnosed with post-traumatic stress disorder, specifically. The research, also, seeks to find new ways to enlighten health care professionals of interventions that patients found helpful towards their recovery to better prepare the future of health care professionals.

Resiliency, Reconciliation, and Peace: Implications for Social Work Practice

Megan Abbott, *Behavioral Sciences*

This qualitative research study explored how adult children, from both America and Vietnam, reconciled the death of their father during the Vietnam War. Participants were involved in the 2 Sides Project, an organization that aims to connect children from opposite sides of the American/Vietnam War. On two occasions, Gold Star Children from the United States were given the opportunity, through the 2 Sides Project, to travel to Vietnam. The trip afforded the opportunity to visit the site of their father's death and meet adult children of Vietnamese soldiers, killed during the Vietnam/American war. This study aimed to discover the impact of father loss on both Gold Star Children and Children of the Vietnamese Martyrs. Topics of reconciliation and peace were also explored in these two people groups. The data, obtained through the form of questionnaires, provides insight into the journey through loss, healing, and reconciliation. The subjects of the study include six sons and daughters of fallen American Soldiers who traveled to Vietnam to meet with six sons and daughters of fallen North Vietnamese Soldiers, referred to in Vietnam as Martyrs. All of the participants are involved in the 2 Sides Project. This study hopes to fill a gap in literature regarding resiliency theory and recovery from parental loss; while highlighting the unheard voices of those deeply impacted by the aftermath of war.

The Effects of Suicide on Professional Caretakers

Jenna Mogg, Emily Bosworth, Chloe Mackay, and Lindsey Violet, *Behavioral Sciences*

This study offers a unique perspective on those who are affected by suicide. There has been a consistent rise over the years in those committing suicide, a topic that has not been talked about enough. People within the community begin to wonder how suicide has directly affected those within the individual's social network. However, there has not been a qualitative study on how this may affect a professional caretaker that has worked with patients who have died from suicide. In this study, professional caretakers are interviewed to discuss the effects of their patient committing suicide. Throughout the interview process, caretakers are asked questions about how they were impacted by the loss of the individual they knew and how they internally processed it. This study analyzes those results and provides a more clear answer as to what extent the professional caretakers is affected by the suicide and what proper grieving steps they have taken to heal in this process.

Inequality and Civic Engagement

Jill Koval, *Social Sciences*

After enduring years of systematized forms of oppression and unequal opportunities afforded by discriminatory law, those of racial minorities continue to be affected by the scars of marginalization throughout American history. Though a decrease in political and communal engagement is a problem evident across all racial identities in the American Democratic system, I hypothesized that this disengagement from politics is especially acute among those of racial minorities. A survey of the existing literature reveals several hypotheses of the reasons behind the general decline in engagement, but most offer solutions that may encourage the participation of some while excluding the involvement of others. One such solution is the use of college education to foster civic literacy and promote future engagement.

Using a multiple linear regression model, I regressed the variable of political engagement over the independent variables of race and education while controlling for income. I found that those of racial minorities engage in politics and their communities 25% less than their “White” counterparts and that an increase in formal education only leads to a small amount of increased engagement. These results led me to conclude that racial minorities are underrepresented in American politics, which is especially problematic for a system built on representational democracy where citizen participation is vital to a successful government. My research also suggests that encouraging college education for increased political engagement is not necessarily the most effective strategy and I propose that efforts be redirected to developing programs outside of formal educational institutions that encourage citizens at a young age to be active in their communities and promote efficacy particularly among those of racial minorities.

BEDFORD

Allies in Circles of Grant County: A Qualitative Study Exploring Experiences

Taylor Bray, Abigail Degenhart, Grace Poole, and Emily Shafer, *Behavioral Sciences*

The prevalence of poverty has become overwhelming for many residents of Grant County, as the poverty rate has nearly approached 20% (Data USA, 2014). In 2015, Grant County was recognized as having the highest child poverty rate in the entire state of Indiana (WFYI Indianapolis News, 2015). As these rates have become progressively startling, the Grant County community has been in dire need of intentional efforts to combat poverty. In 2012, a Circles chapter was created in Grant County to fulfill this needed role. Circles is a national model that seeks to partner with families and individuals in poverty and empower them. Circles provides the families in poverty, called Circle Leaders, the education and social support that is needed to escape the cycle of poverty and thrive. Volunteer mentors, known as Allies, partner with a Circle Leader and build an intentional relationship where they can work together to meet personal goals. This phenomenological study focuses on gathering the lived experiences of the Circles Allies through semi-structured interviews. This study will focus on gathering the Allies’ opinions about the Circles program, the Allies’ perceptions of themselves, and their value systems. These interviews will then be analyzed to identify common themes. The researchers hope to capture the experiences of the Allies in order to have a more holistic view of how community programs impact everyone involved.

LEEDY

What if the color that segregated America was red?: Redlining and Residential Segregation in Toledo, Ohio

Anna Frantz, *Behavioral Sciences*

America, the “Land of Opportunity” is recognized for its people’s ability freely pursue the American Dream. However, it is no secret that not everyone in America has seen this dream come true. Many Americans recognize and would agree that historically there has been and continues to be a connection between race and class in American society. Furthermore, most would agree that there are discrepancies amongst the living conditions of the classes. However, what people may not recognize or acknowledge is that there are systemic culprits to such disparity. Inequality can be seen in job opportunities, income levels, housing, health, safety, and education. People’s opportunities and access to such things are largely dependent on where they live and because of historical racial segregation, there are undeniably particular discrepancies between the opportunities of whites and of African Americans due to residential factors. Today, African Americans continue to suffer from the consequences of racially segregated housing as it persists in the United States. This project delves into the history of redlining in the United States and specifically in Toledo, Ohio as well as observes current day correlations of racial concentrations and discrepancies in opportunity.

Segregating America with Red: Redlining and Residential Segregation in Rochester, New York

Allen Beaujon, *Social Sciences*

For Rochester, New York, the traditional public narrative of racial reconciliation and equality begins and ends with the life of Frederick Douglass. Through this myopic story, Rochester holds tightly to the illusion of progress ahead of the rest of the country. The history of Rochester, however, reveals a more complicated history and that the city discriminated against its African American population through neighborhood segregation. Rochester isolated the African Americans who came to Rochester throughout the Great Migration into two neighborhoods which lacked equal access to employment, adequate housing, and education. This system of oppression led to the city's riots on July 24, 1964 and the city's involvement in the Civil Rights Movement. This forgotten story illustrates how the history of neighborhood segregation and the civil rights movement affects the each local city's narrative.

AFTERNOON SESSIONS

2.00 PM

BEDFORD

The Role of the PER/CRY Heterodimer in Mammalian Circadian Rhythm

Shannon Morrison, *Natural Sciences*

Most organisms display a daily rhythmic variation in physiological responses known as circadian rhythm. While the circadian rhythms of cells in the central nervous system and, specifically, the central “clock” in the suprachiasmatic nucleus are regulated by light, the circadian rhythms of peripheral organs such as the liver and pancreas are primarily regulated by food intake. There are two primary limbs of circadian rhythm in all cells, a positive and a negative limb. The positive limb consists of the proteins CLOCK (Circadian Locomotor Output Cycles Kaput) and BMAL1 (Brain and Muscle ARNT like protein 1). These proteins heterodimerize and activate the genes for Period (Per) and Cryptochrome (Cry), transcription factors that form the negative limb. The PER/CRY heterodimer builds up in the cytoplasm until it reaches a high enough concentration to move back into the nucleus and inhibit the CLOCK/BMAL1 heterodimer. The purpose of this literature review is to describe the current knowledge on the roles of PER and CRY and their regulation. This review of scientific literature suggests that CRY1 expression is increased during the transition from feeding to fasting. The overexpression of this gene resulted in decreased blood glucose levels and improved insulin sensitivity, especially in diabetic db/db mice. In CRY1/CRY2 knock-out mice, glucose intolerance and decreased body weight were observed, suggesting that CRY plays a role in glucose uptake. In liver cells, CRY1 inhibits the transcription of PEPCK (phosphoenolpyruvate kinase), the primary enzyme in the rate-limiting step of gluconeogenesis. CRY KO mice are also more susceptible to diet-induced obesity and diabetes mellitus. This review also suggests that PER2 expression is greatest during the fasting-feeding transition, and thus is strongly driven by food signals. It promotes liver glycogen storage during the refeeding period by activating Gys-2 expression, and its activity is opposed by BMAL1 during the fasting period. PER2 regulates glycogenolysis during the fasting period by activating GL and PTG expression. Its most important function, then, is to promote liver glycogen storage during the refeeding period.

2.20 PM

BEDFORD

Development of selective and potent bivalent inhibitors of the tyrosine phosphatase SHP2

Marissa O'Hair, *Natural Sciences*

Protein tyrosine phosphatases (PTPs) are responsible for regulating cellular signaling pathways within the human body by catalyzing the removal of the phosphate group from a phosphorylated tyrosine. When mutated or misregulated, PTPs have been linked to many diseases including LEOPARD Syndrome, Noonan Syndrome, diabetes and various cancers. By making a selective inhibitor for SHP2, the PTP can be prevented from misregulating cellular signaling pathways. Creating a discriminatory inhibitor for SHP2 is challenging due to the highly similar active site structures of the 107 phosphatases found in human cells. One approach is to generate a bivalent inhibitor composed of a generic PTP inhibitor for potency coupled to a SHP2-targeting peptide for selectivity. These pieces are assembled in situ by the self-labeling enzyme SNAP-tag. Alternatively,

a traditional medicinal chemistry route can be utilized by developing a small molecule library of inhibitors to test for SHP2 selectivity. In order to test the efficacy and selectivity of each approach, all inhibitors would need to be tested in an activity assay against both SHP2 and SHP1 phosphatase.

2.40 PM

Antimicrobial Use and Extraction of Essential Oils

Julie Webster, *Natural Sciences*

BEDFORD

With the growing popularity of alternative medicine, essential oils have become commonplace in the American home. Diffusers pump the oils into the air, some use them as cleaning products, and some parents prescribe them for their children's headaches. In a world searching for new medications with the ability to fight antibiotic-resistant bacteria, the general acceptance of essential oils inspired many to turn to them as the next solution. This research project investigates the antibacterial properties of two essential oils – basil and lavender – and how extraction technique influences their use as antimicrobial agents. By measuring the zones of inhibition of each oil against both gram-positive and gram-negative bacteria as well as bacteria that naturally occurs on the skin, we were able to measure the effectiveness of these oils in defending against bacteria like *S. epidermis* and *S. typhimurium*. Analysis of the oils' antimicrobial properties with a Kirby-Bauer Disk Diffusion Test, serial dilutions, and growth assays helped to create an accurate picture of the potential for these oils as agents of inhibition.

Educational Success of First Generation Students

Jeff Marshall, Johnny Rhodes, Evan Wilcox, *Business*

LEEDY

This study was designed to measure the relationship between the success rates of first-generation college students and all other college students. The bar of success was measured using semesters completed with a GPA of above 3.5. Having family members with prior experience in higher learning may give students certain advantages which could lead to having more academic success. On the one hand, different family demographics may make it more difficult to adapt to college. On the other hand, the idea of being the first person in a family to have the privilege and capacity to attend college may cause students to have an instilled drive that brings them to success. The results of this study provide insight into how the different challenges of adjusting to college between first-generation students and other students might cause different academic effects.

3.00 PM

Coming to America: An Examination of the Relationship Between Immigration and Crime Rates

Benjamin Pettus, *Social Sciences*

BEDFORD

Economic research has, historically, demonstrated little support for the general proposition that increased immigration yields higher crime rates. Yet, despite empirical evidence to the contrary, the belief that "immigrants bring crime" continues to influence social and political discourse. Using the fifty states and the District of Columbia as units of analysis, this research attempts to analyze the relationship between immigration and both violent and property crime rates in the year 2016. This study seeks to measure the effects of both documented and undocumented immigration on crime rates while controlling for economic and demographic variables of state populations. This research utilizes OLS regression models to discern the relationships between immigration and crime. The results

of this research indicate that immigration is inversely related to property crime. Poverty rate is positively associated with property crime. The unemployment rate and per capita GDP are positively associated with violent crime. Undocumented immigration displays no association with either violent or property crime rates.

Demographics and Unawareness of Racial Issues in Grant County

Hannah Bowman, Elise Hervey, Jazmin Morales, and Jaclyn VanCise, *Social Sciences*

In 1930 Grant County, specifically, Marion, Indiana was recorded to be the last lynching in Indiana. Grant County still appears to struggle with racial prejudice among its residents. This quantitative study aims to examine the relationship between demographics and unawareness of racial issues in Grant County. Through convenience sampling, the study examines the various demographics of Grant County including sex, race, age, religion, education level, and socioeconomic status. Discrimination has been an overarching issue in the United States since the first settlers. The unjust treatment of people due to different characteristics including race, sex, and age has been a widespread topic of concern. In recent years, the subject of prejudice attitudes and beliefs have been at the forefront of political and societal debate in America.

This study focuses on the unawareness of racial issues including racial privilege, institutional discrimination, and blatant racial issues, specifically how demographics affect their disposition. The researchers, through this study, hope to gain a better understanding of the populations, specifically in Grant County, who appear to display more signs of colorblind attitudes. The data collected can then be used to educate and empower Grant County on its level of racial awareness and to promote unity amongst the county. The results can also be used to support policy change to create a better community among Grant County residents. Ultimately the goal of this quantitative study is to increase racial appreciation and understanding to provide knowledge that leads to inclusion and equality.

Conforming or Reforming? A Feminist Reading of Christian versus Popular Romantic Fiction

Jessie Dion, *Modern Language & Literature*

In a survey of nine romance novels from bestseller lists in 2015-16, this paper will conduct a critical feminist reading to determine some of the differences between popular and Christian romantic fiction. Critical literary readings are most often performed on classic texts, but are rarely performed on more modern texts with measurably high readership. This paper will turn a critical eye to the publications intended for the popular reader – who is, as research has shown, a critical reader. Through my research I studied four critical elements in each novel: men's and women's roles, power structures, female friendships, and subversion of patriarchal assumptions. Christian novels tend to use Biblical archetypes and fit women into the patriarchal system which places God first, then men, women, and then children in age order. Popular romantic fiction works tend to have a freer power structure, allowing men and women to share control, as well as displaying a vastly diverse canon of authors and characters. Ultimately, Christian fiction adheres to the Christian model of the family with little diversity, while popular romantic fiction allows for diverse intersections and different types of lifestyles. Since romantic fiction is intended to be relatable for its readers, this subject has profound implications for the Christian publishing industry.

Intrinsic and Extrinsic Factors Affecting Return to Play Motivation in Injured Collegiate Athletes

Abigail Manwell, Sydney Mella, and Matthew Rosser, *Health and Human Performance*

The motivation of return to play following an athletic injury among intercollegiate athletes at Indiana Wesleyan University (IWU) differs between athletes and the goal of this research was to compare intrinsic and extrinsic motivation for sport participation following an athletic injury. With university Institutional Review Board approval, the Sport-Motivation Scale (SMS) and Return to Sport after Serious Injury Questionnaire (RSSIQ) were used in conjunction to compare these factors within a population of participants from IWU. Participants were male and female National Association of Intercollegiate Athletics (NAIA) Division II athletes over the age of 18. Participants completed a survey containing the SMS, RSSIQ, and demographic questions. Participants were asked to self-report a previous or current injury sustained during their participation in intercollegiate athletics that resulted in lost time. The survey questions were used from existing surveys along with the addition of new questions was used to better target the response to health care, athletic training specifically. Having more information on the motivation of return to play, the researchers believe there can be an increase in patient and clinician outcomes of treatment and rehabilitation. After the surveys were completed, investigators compared data and evaluated commonalities in intrinsic and extrinsic motivation of IWU intercollegiate athletes to determine what motivates athletes to return to play that sustained an injury resulting in lost time from competition or practice.

LEEDY

3.40 PM

The Glass Billiards Problem

Morgan Bounds, *Mathematics & CIS*

A new twist on classical mathematical billiards, the glass billiards problem examines what happens when a mass-point starts making elastic collisions in an arena with edges that vanish once struck. Does every arena have a billiard trajectory that guarantees all edges vanishing? This research identifies key patterns that emerge in response to this question.

BEDFORD

Appraisal of Clinician Empathy and Its Influence on Patient Outcomes

Christine O'Leary, *Health and Human Performance*

The significance of empathy in patient-clinician interactions grows increasingly important as healthcare enters an age of greater technological advancement. Fewer people converse face-to-face due to the expansion of internet communication. This lack of interaction heightens the need for empathetic clinical care. Patients in a vulnerable state need to feel their clinician is competent, caring, and communicative. The role of empathy in clinical care has been studied previously, but its growing impact calls for a deeper understanding. The research presented here consists of several studies with evidence that empathetic clinical practice not only enhances the patient experience but positively influences injury outcomes. The researchers hypothesize that the study to be conducted will further prove the importance of empathy in the athletic trainer – patient relationship.

LEEDY

Glia: They're Probably More Important Than We Realize

Hannah Caringal, *Natural Sciences*

Regulation of synaptic transmission is fundamental for neuronal signaling, and ultimately, understanding regulatory mechanisms provides the opportunity for better understanding the impacts of dysregulation. In particular, numerous studies in the central nervous system have demonstrated the ability of the pH of a synaptic environment to significantly affect synaptic transmission. Within the retina, it has been shown that extracellular acidification within synapses diminishes neuronal signaling. Utilizing fluorescence imaging techniques to measure intracellular calcium stores and self-referencing microelectrodes to measure proton fluxes of Müller glia cells isolated from tiger salamander retina, the Kreitzer lab has characterized two pathways through which Müller glia cells evoke extracellular acidification. The work presented here shows Müller glia cells extrude protons when extracellular ATP activates P2Y1 receptors that elicit production of the intracellular messenger IP3, leading to a rise in intracellular calcium. This calcium-dependent pathway likely involves Na⁺/H⁺ exchangers and is sensitive to extracellular Na⁺ and K⁺ concentrations. Additional studies carried out by this collaborative research team observed this extracellular synaptic acidification in other species (including humans) and brain tissues, such as rat cerebral cortex glia. Collectively, these studies suggest glia of the central nervous system possess a highly conserved mechanism that allows them to be potent acidifiers of synapses. The breadth of this regulation observed across different regions of the CNS and across species carries significant implications for the role of glia in shaping neuronal signaling.

Rescue of Osteoblasts from Zoledronate-Induced Apoptosis, Necrosis, and Senescence

Ethan Blake, *Natural Sciences*

Zoledronate (ZOL) is a nitrogen-containing bisphosphonate (NBP) used in the treatment of bone diseases such as osteoporosis, Paget's disease, and cancer metastasis to bone. ZOL is the most potent of the NBPs, many of which, especially ZOL, have recently been linked to bisphosphonate-related osteonecrosis of the jaw (BRONJ), a disease in which oral lesions occur in the maxillofacial region, particularly after oral surgery. Geranylgeraniol (GGOH) has been shown to have a rescue effect on some cells negatively affected by ZOL, likely by providing an alternate route in the mevalonate pathway, a critical pathway necessary for viability in cells. ZOL blocks the mevalonate pathway in osteoclasts to inhibit their activity, but as to how this mechanism leads to BRONJ and the inability of oral wounds to heal is currently unproven. This study investigated potential ZOL-induced cell death effects, including apoptosis, necrosis, and senescence, on MC3T3-E1 osteoblasts, as well as the possible rescue effect provided by GGOH when used in combination with ZOL. APOPercentage® dye apoptosis assays and LDH release assays on these cells revealed a significant increase in both apoptosis and necrosis, respectively, with the addition of 50 μM ZOL. Furthermore, the results indicate a significant decrease in necrosis with the addition of 10 μM GGOH used in combination with 50 μM ZOL. In addition, these results suggest greater rescue from both apoptosis and necrosis when an additional 10 μM GGOH was added 24 hours after the initial treatment. Finally, confocal fluorescence microscopy was used to visualize the effects of ZOL on MC3T3-E1 cells, with the expected results being pyknotic nuclei reminiscent of apoptosis. However, more prevalent were expanded actin cytoskeletons, suggestive of cellular senescence. The absence of apoptotic nuclei was possibly the result of procedural methods, but further studies must be done to support this hypothesis. A return to normal cell size was seen in ZOL-treated cells exposed to GGOH, suggesting a rescue from senescence.

The Effect of Humidity and Purity on Vitamin Degradation Kinetics

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Research supports a clear relationship between temperature and the reaction rate of a compound; however, the relationship between humidity and reaction rate is observable but largely debated. The rate of degradation varies depending on the compound's purity, crystallinity, hygroscopicity, as well as the humidity and temperature in which the compound is contained. Beyond this primary layer of focus lies variables that are not only more challenging to control for, but that also form a complex web of relationships that alter degradation. Such a large number of variables makes it difficult to study individual alterations to a compound but makes the importance of this research clear. Our research is working toward solidifying our knowledge of the relationship between humidity, purity, and reaction rate by testing the discussed variables on pharmaceuticals, namely niacinamide (Vitamin B3) and ascorbic acid (Vitamin C). Using chambers holding constant temperature and humidity, we collected samples over a period of weeks and then utilized liquid chromatography and UV spectrophotometry to analyze the degradation of the vitamins. Ultimately, this project is striving for a more thorough understanding of degradation kinetics and a more accurate prediction of medicinal shelf-life incorporating humid environments.

Developing a Rutherford Backscattering Spectrometry Station for TUNL

Andrew Wantz, *Natural Sciences*

Rutherford backscattering spectrometry (RBS) is a technique used to characterize solids via surface-layer analysis. RBS is performed at TUNL to better understand the targets that are used in experiments. The RBS chamber located at TUNL was upgraded by increasing the number of detectors and improving the vacuum. The baseline vacuum was reduced from $2\text{E}-5$ to $7\text{E}-7$ torr. The number of detectors was increased from one to four to allow for better characterization of complicated targets. These were integrated into the existing data analysis system. Silicon dioxide targets were produced and RBS analysis was performed. The RBS data was fit with SIMNRA software. The experimental cross section was compared to the theoretical cross section given by the Rutherford formula. Our results show good agreement between the two.

Expression and Purification of a SNAP-tag Fusion Protein

Rachel Johnson, *Natural Sciences*

The human genome has 107 protein tyrosine phosphatases (PTPs). PTPs regulate cellular signaling pathways within human bodies. If PTPs become mutated or misregulated they can cause a variety of diseases or cancer. One oncogenic PTP, SHP2, has been found to cause cancers, Noonan's syndrome, and diabetes. Because PTPs all have highly similar active sites, it can be tricky to inhibit just one PTP without inhibiting all PTPs. In order to selectively inhibit SHP2 and the oncogenic pathway it regulates, a bivalent inhibitor is needed to inhibit the enzyme both specifically and potently. The two parts of the inhibitor will be assembled *in situ* by a self-labeling enzyme SNAP-tag. The SNAP-tag is expressed in recombinant *E. coli* and then purified and tested using a Western blot. The complete inhibitor will then be tested in an activity assay against both SHP1 and SHP2 phosphatase.