Symposium 2016 Poster Presenters

Each Poster presenter is listed below, along with a title and an abstract of their project.

Adden, Lisa ***"Characterization of Molecular Mechanisms of Silver Nanoparticle Toxicity in Escherichia coli (E. coli)"***

Silver nanoparticles (Ag-Nps) are widely used in industry and medicine, but potential effects of environmental exposures are poorly characterized. This study investigated mechanisms of Ag-Np toxicity in Escherichia coli, with a focus on effects of reactive oxygen species (ROS) production. Because agglomeration causes Ag-Nps to behave like bulk materials, we confirmed nanostate chemistry by Malvern Zetasizer prior to analyzing antimicrobial effects. These studies demonstrated that Ag-Nps agglomerations were sensitive to salt concentration and temperature; therefore low salt (0.05% NaCl) LB solution and low temperature (32o C) were used for subsequent experiments. Ag-Nps had a significant effect on E. coli growth kinetics, delaying entry into log phase growth. Bacterial sensitivity was analyzed via disk diffusion assays with varying masses of Ag-Nps per disk (0-25 μg/disk). Significant inhibition of growth was observed at 0.78 μg Ag-Nps/disk. Minimum inhibitory concentration (MIC) and minimum bactericidal concentrations (MBC) tests performed in LB media supplemented with varying concentrations of Ag-Nps (1-100 μg/mL) demonstrated the MIC for Ag-Nps was 50 μg/mL: MBC was 150 μg/mL. Intracellular ROS levels were measured with H2DCFDA staining: a significant increase of intracellular ROS was detected at 1.562 μg Ag-Nps/mL. Protein carbonyl formation was measured using a colorimetric assay and lipid peroxidation by the TBARS assay to assess effects on macromolecules. Ag-Nps significantly increased protein carbonyl formation and lipid peroxidation at 3.125 μg/mL. Thus, it appears that silver nanoparticles inhibit microbial growth and induce ROS and oxidative stress at μg/mL concentrations. Such knowledge can contribute to the ecological risk assessment of these emerging contaminants.

Ali, Md ***"Molecular and Biochemical Characterization of the Wild Type Drosophila Melanogaster that Produces Enhanced Levels of ROS after Exposures to Sub-lethal Amounts of Ivermectin"***

Insect pests damage agricultural crops and also transmit various human and animal diseases. Resistance to insecticides is the main threat to sustainability of any arthropod pest control programs. The biochemical and molecular pathways, which lead to inheritable resistance in insects, are very poorly understood. Reactive oxygen species (ROS) are known to be elevated under insecticide induced stress. ROS, such as superoxide anion radicals, are converted by superoxide dismutase to hydrogen peroxide, which then pass out of the mitochondria and endoplasmic reticulum. Hydrogen peroxide is, then, readily diffused into cell nucleus and converted into hydroxyl radical which is known to mutate DNA. If this event happens in germ cells, this mutation can be inherited and involved in evolution of resistance. Using the glass vial contact method, a dose dependent mortality response (LC50 = 0.001%) was established following 72 hours of ivermectin exposure. After ivermectin exposure, levels of ROS in fly ovaries were determined using a fluorescent probe (Hydroxyphenyl fluorescein). The level of

ROS in ovaries of 1% ivermectin treated flies was 1.9 fold higher than the level of ROS in ovaries of control flies ($p < 0.05$). It is expected that ROS induction by sub-lethal amounts of ivermectin will increase levels of malondialdehyde, a product of lipid peroxidation, and DNA adducts, such as M1-dGp, in the fly gonads. The transcription levels of detoxification genes will be also monitored over different generations using quantitative real time PCR.

Alizadehyazdi, Vahid ***"Stability of the Discrete Time Transfer Matrix Method"***

In Transfer Matrix Method, the size of matrices does not grow with the number of degrees of freedom which makes the calculation efficient. The discrete time transfer matrix method can solve two limitations of Transfer Matrix Method which is limitation to linear and frequency domain systems. Now, we are studying the stability of DT-TMM method which make this method more accurate and efficient.

Allen, Nichol ***"Relocating a Forgotten Center: 1301 North Main Street and the Unheard Voices of Old Edwardsville"***

My historical project looks at uncovering the significance of historical locations within the city of Edwardsville. Projects like these enrich the communities in which we live and draw connections between scholars and community members. One of the most powerful things about history as a discipline is that it provides opportunities for a community connection: between campus and community, between researchers and the public, between past and present. By creating awareness through history, citizens are able to gain insight to their present through an examination of their past. 1301 North Main Street finds itself in a forgotten part of town that once was the social epicenter of the city. By looking at this one structure I was able to trace the transformation of the city from 1816 until present day. 1301 North Main Street is significant because this one single house connects us to the early settlement of Edwardsville, to the formation of a free black community, and delivers us to a modern town. By illuminating social and cultural shifts, I am able to show the unwritten history of a city of Edwardsville that time has eroded away. I have been able to bring to light how one structure can trace the lineage and genealogy of a town. This project allowed me to use my craft in new and innovative ways. I was able share my knowledge and education by teaching non-historians what is essential to understanding and creating history. This project belongs to the city of Edwardsville, but I was able to facilitate the research and information that will result in the addition of a historical landmark.

Atiquzzaman, Md ***"Algorithms to Detect Driver Distraction Using a Driving Simulator Study"***

The increasing trend in crashes and consequent fatalities due to distracted driving is a growing safety concern in our road network. With rapid advancement in cell phone and in-vehicle technologies along with driver's inclination to multitasking, the number of crashes are further on the rise. Many previous studies attempted to detect distracted driving behavior in real-time to mitigate this issue. However, these studies mainly focused on detecting either visual or cognitive distractions, while most of the distracting tasks demand driver's visual, cognitive, and physical workload, simultaneously. Additionally, previous studies frequently used eye, head, or face tracking data, although current vehicles are not equipped with such technologies. Therefore, this study focused on developing algorithms for detecting specific distraction tasks using only vehicle control and driving performance measures. Specifically, algorithms were developed to detect two distracting tasks – texting and eating/drinking. Three data mining techniques were explored – Linear Discriminant Analysis (LDA), Logistic Regression (LR), and Support Vector Machine (SVM). SVM algorithms found to outperform other two techniques, which detected texting and eating/drinking distraction with an accuracy of 84.33% and 79.53%, respectively. This study may provide useful guidance to successful implementation of distracted driver detection algorithm in Vehicle to Infrastructure (V2I) and Vehicle to Vehicle (V2V) communication, as well as to auto manufacturers interested in integrating distraction detection systems in their vehicles.

Bennett, Branden ***"Characterization of Brux-like Motor Patterns in the Freely Behaving Rat: Electromyography and Sonomicrometry"***

Human bruxism is a neurological disorder that involves involuntary grinding of the teeth. Untreated, bruxism can lead to loss of enamel, broken fillings, and many other dental problems. Currently, the etiologies of bruxism are not well understood, but research suggests malocclusion, neurological changes in the basal ganglia, or both. Central pattern generators (CPGs) are special circuits in the brain and spinal cord made up of interneurons to generate coordinated motor outputs and rhythmic movements. Electromyogram (EMG) recordings of a jaw closing muscle (anterior superficial masseter) and a jaw opening muscle (anterior digastric) were utilized in order to characterize these motor patterns produced by CPGs in both brux-like and masticatory behaviors in the laboratory rat (n=10). Sonomicrometry, a novel technology that uses ultrasound to determine distance, was utilized in the anterior superficial masseter in order to compare the physical movement of the muscle to the electrical firing patterns shown by the EMGs. We found that the anterior digastric and the anterior superficial masseter muscle were antiphase during mastication (mean = 0.865), and were in phase during brux-like movements (mean = 0.176). The strength of coupling (r) on a scale from 0 to 1 was also calculated. The coupling strength during brux-like movements was: r = 0.778, while the r = 0.893 during mastication. This, along with the preliminary analysis of the sonomicrometry lead to the possibility that the anterior superficial masseter muscle may contribute a larger influence over the jaw movements during brux-like movements than it does during masticatory movements.

Bivens, Jennifer ***"The Effects of Interactional Justice Perceptions of Performance Appraisal Feedback on Appraisal Satisfaction, Counterproductive Work Behaviors, and Self-efficacy"***

There are many factors that influence the success of employees in organizations, one of which is the perception of interactional justice. Interactional justice combines two forms of justice: informational justice (the degree to which employees are given relevant information) and interpersonal justice (whether employees are treated with dignity and respect) (Bies & Moag, 1986; Patient & Skarlicki, 2014). When employees are interpersonally mistreated and offered inadequate explanations of outcomes and procedures at work, the result may include feelings of unfairness and dissatisfaction (Salvarajan & Cloninger, 2012). Thus, the present study sought to explore how perceptions of interactional justice during a performance review influence appraisal satisfaction, counterproductive work behaviors, and workplace self-efficacy. Methods: A survey was designed to measure the degree to which 138 employees perceived interactional justice during their performance appraisal as well as how satisfied they were with the appraisal, how self-efficacious they feel at work, and how often they engage in counterproductive work behaviors. Results: Correlational analyses revealed that employees who perceive high levels of interactional justice during their performance appraisal feel more satisfied with the appraisal, more capable or self-efficacious at work, and engage in counterproductive work behaviors less often than those who perceive low levels of interactional justice. Also, a mediated regression revealed that appraisal satisfaction partially mediated the relationship between interactional justice and self-efficacy. Conclusions: These findings 1) demonstrate the strong impact that interpersonal exchanges have on employees' attitudes and work behaviors and 2) inform numerous workplace interventions and applications.

Busa, Vineel ***"Chemical Flow Analysis of Hydrofracking Technique in Shale Gas Extraction"***

This study deals with the impact of hydraulic fracturing of shale gas reservoirs on the drinking water resources present in the groundwater aquifers. The natural gas and oil from shale gas reservoirs cannot be extracted by using the conventional methods of extraction due to very large depths of shale reservoirs from the ground level. The hydraulic fracking technique which is more advanced technology than conventional methods is used in the extraction process. In this technique fracking fluid, which consisting of large number of chemicals, heavy amount of water and sand are sent into the shale reservoir to make fractures in the reservoir rock, which helps in the extraction process of the shale gas from the shale reservoir. Most of the fracturing fluid used can be recovered in the form of back-flow. A very small portion of the fracturing fluid is left without being recovered, which may lead to some potential impacts on drinking water resources in the aquifers. This study deals with the toxic chemical's velocity range from the shale gas reservoir, so that more detailed information can be extracted about impacts of hydraulic fracking technique on groundwater aquifers.

Carter, Kathryn ***"Osteopontin (OPN) Enhances Migration in Human Salivary Gland Cancer"***

Osteopontin is a key regulator of survival, proliferation, migration, and invasion pathways in human cancers. The objective of our study was to determine if OPN can directly influence the enhanced cell migration seen in human SG cancers. Normal SG cells (HSG), cancer SG cells (HTB41), and OPN-silenced, cancerous SG cells (siOPN/HTB41) were maintained at 37°C in a 5% CO2 environment. All cells were grown to confluence on uncoated cover-slips or with recombinant human OPN (rhOPN). A 2-dimensional gap-closure assay and a 3-dimensional migration assay were performed on all four groups. A uniform “scratch” was created with the tip of a sterile micropipette tip on Day 0, and cells were imaged every 24 hours. Normal HSG cells migrated and almost infiltrated the “scratch” by Day 4. Cancerous HTB41 cells migrated at a faster rate than HSG cells to obliterate the “scratch” in <48 hours. Normal HSG cells on rhOPN mimicked the eliminated the “scratch” by Day 2. OPN-silenced cancer HTB41 cells required 4 days to obliterate the “scratch”. Using rhOPN as the chemoattractant in transwell migration assays, normal HSG cells showed significantly higher migration rates as compared to naïve HSG cells and OPN-silenced cancer HTB41 cells ($p \leq 0.001$), and were comparable to migration exhibited by cancer HTB41 cells. Cancer cells are known to exhibit increased proliferation, migration, and the ability to invade into the surrounding tissue and metastasize. Consequently, cancer progression and metastasis is the most common reason for fatalities. We show that OPN plays a direct role in enhanced migration associated with human SG cancer cells. Thus, OPN could serve as a potential therapeutic target to hinder migration and potential metastasis in SG cancers.

Dasari, Srinivas ***"School Bus Safety"***

This paper clearly represents usage of school bus from early times and test performed on the school bus before they are launched in to the school, there are three types of testing in which school bus level of safety is verified and then advantages of gps in school buses and the seat belt usage in school is discussed briefly including advantages of school buses in all aspects for transporting school children and determining school bus stop location and discussed the crashes related to school bus and new enhancements took place in developing school bus safety.

Duffy, Daniel ***"Catalysts for Collaboration in Program Redesign in Higher Education"***

This qualitative study is part of a larger study conducted by the Illinois Education Research Council that sought to evaluate the implementation of the Early Childhood Educator Preparation Program Innovation (EPPI) grant. The purpose of this grant is to strengthen the training of early childhood educators and align all early child education (ECE) programs with teaching standards. The grantees consist of partnerships that include community colleges, four-year institutions, and in some cases community-based entities or schools. Through structured interviews, grantees discussed the many challenges and necessities in collaborating with other higher education

institutions, community partners, and licensing boards. Often, university programs offer a variety of entry and exit points, multiple degrees and licensure and are required to fulfill a myriad of teaching credentials and standards. This presentation provides a glimpse into the reported catalysts for the grant related activities. Major catalyst themes include: capacity for cooperation, shared values, grant provided impetus, innovative steps, use of technology, and integral player. These qualitative results were found to align with McQuaid's (2009) partnership development theory, which also looks at change through collaboration in the public domain.

Escopy, Samira ***"Synthesis and Evaluation of Thiophenyl Sialyl donor bearing Picoloyl at C-4"***

N-acetylneuraminic acid is the most abundant member of the sialic acid family. Its biological importance, as terminal component of glycoconjugates, ranges from cell-cell interactions to pathogens attacks, to oncogenesis. Chemical sialylations are perhaps one of the most challenging glycosylation reactions in carbohydrate synthesis, due to the structural features of sialic acid. Thus, high yields, with a complete stereocontrol on a wide variety of building blocks, is still a synthetic goal in the field. Our recent finding on the existence of a conformational equilibrium at the oxacarbenium ion level suggested that position C-4 might be relevant in sialylation reactions. In light of recent reports by Demchenko et. al on Hydrogen-bond-mediated aglycone delivery (HAD), we report herein the synthesis and testing of C-4 Picoloyl protected sialyl donors.

Farahbakhsh, Pooya ***"Seismic Design of Rocking Shallow Foundations for Ordinary Bridges Located in Midwest"***

The interaction between the soil and foundation of superstructures has been the subject of research for the past few decades. The subjects of rocking of shallow foundations has drawn significant attention due to its advantages over common elastic design guidelines. Previous studies suggest that bridges designed based on rocking foundation effect are safer, more reliable and cost effective when compared to foundations designed according to conventional linear fixed-base methods (Deng et al. 2014). Also, case history studies conducted on bridges damaged by the Kobe earthquake suggest that the rocking of foundations may play a critical role in preventing major damage to bridge columns (Yashinsky and Karshenas 2003). This can explained by the fact that rocking shallow foundations contribute in dissipating earthquake energy which commonly is supposed to be absorbed by the columns.

However, most of the current seismic design guidelines of bridge footings do not suggest application of a nonlinear soil-structure interaction. Despite this fact, based on studies on behavior of rocking foundations, extensive efforts have been made by previous researchers for applying rocking foundation effect to design guideline of ordinary bridges (e.g. Mergos and Kawashima 2005; Deng et al. 2009; Deng and Kutter 2010). Recently, application of non-linear soil structure interaction which allows the earthquake energy to be absorbed by rocking foundation were implemented in seismic bridge design guidelines of New Zealand. Also, Deng

et al. (2014) investigated the implementation of rocking foundation effect in the case of ordinary bridge footings in California State and presented a direct displacement-based design (DDBD) method for seismic design of rocking shallow foundations.

In this paper, the application of the non-linear seismic design method in case of ordinary bridges in Midwest is investigated. For this purpose, an actual ordinary three-span bridge constructed in state of Missouri is modeled and analyzed using SAP. The mentioned bridge is designed based on the 2002 AASHTO bridge design guideline which does not take into consideration the effect of rocking foundation. The moment capacity and the earthquake loads induced to the footing, in case it is allowed to rock, are calculated using the design procedure suggested by Deng et al (2014). The results obtained from SAP software in regard to conventional elastic behavior of soil-structure interaction are then compared to the ones calculated based on rocking foundation effect.

Firsching, Wendy *"Improving Pedestrian Safety in School Zones"*

Traffic safety in school areas is of paramount importance. The Highland elementary school was built in 1935, the old layout cannot meet the current traffic needs. The study will focus on creating an improvement traffic plan for the elementary school. A comprehensive investigation will be conducted to review the existing traffic plan and identify potential hazards. Also, new techniques to separate and protect the student population from vehicles will be researched. Based on the investigation and research, an improvement traffic plan will be developed, which will consider the age of the students, the number of parent transporters, bus traffic, and potential conflicts.

Gabel, Alison "*Group Art Therapy Mechanisms of Change*"

This meta-synthesis provides an analyzation of group art therapy literature with an emphasis on mechanisms of change. As of Fall 2015, a synthesis of group art therapy literature within the field of art therapy is not available. This meta-synthesis not only provides a first review of its kind, but also provides insights about future research needed to establish group art therapy efficacy. This research project synthesizes all relevant and available group art therapy literature to determine current trends, insights, and themes of group art therapy mechanisms of change.

Garlapally, Vineet "*Effects of ZnO Nanoparticles on Xenopus Laevis Tadpoles"*

Nanomaterials are elements of emerging technologies that have innumerable applications in electrical engineering, material science, chemistry, and medicine. Rapid strides in these industries have accelerated the institution of nanomaterials into a variety of products such as marine paint and cosmetics. Toxicological testing of nanomaterials is imperative because the size

of nanomaterials may create new toxicological issues for compounds that are relatively inert as bulk material. Aquatic environments receive pollutants from many sources, such as storm-water runoff, industrial discharges, and illegal dumping. The expansion of industry over the past century has led to the generation of toxic wastes and by-products, many of which end up in aquatic environments. Studies have revealed that nano-Zno lead to mortality in shellfish and zebrafish. Past studies have shown that nano-ZnO lead to inhibit of metamorphosis in X.laevis .The purpose of this research is to determine, how the ZnO nano particles influence the thyroid hormone release in Xenopus laevis tadpoles, and its effect on metamorphosis. As metamorphosis is heavily dependent on thyroid hormone tadpoles will be exposed to various concentrations of ZnO nanoparticles and the levels of corticotropic releasing factor and thyroxine hormones involved in thyroid homeostasis will be measured in paraffin embedded section using immuno-histochemical techniques.

Ginder, Melissa ***"Gender Differences in Perceptions of Discrimination in STEM Fields and the Interactive Effects of Coping Self-Efficacy on Job Outcomes"***

The current study aims to understand the gender-biased discrimination women face in male-dominated fields and how this affects their intentions to quit and job satisfaction. The mediational effects of coping self-efficacy are also investigated to see if it may mitigate the negative outcomes of discrimination women face in STEM careers.

Glushko, Anna ***"Association between Supervisor's Supportive Leadership, Perceiver's Personality, and Organizational Attitudes"***

The present study explored the association between personality, perception of supportive leadership, and their combined effects on employee satisfaction, commitment, and perceived organizational justice. We theorized, based on Path-Goal Theory of Leadership (House & Mitchell, 1975), that qualities associated with supportive leadership displayed by the supervisor will result in higher ratings of job satisfaction, job commitment, and perceived justice reported by the workers. We also proposed that participants high in agreeableness and conscientiousness traits, as defined by the Big Five personality inventory (Tupes & Christal, 1961), will have higher ratings of perceived supportive leadership. Undergraduates from a Midwest state university were surveyed (N = 261). Pearson's r was conducted to examine the relationship of six variables— supportive leadership, agreeableness, conscientiousness, employee commitment, satisfaction, and perceived organizational justice. Supportive leadership was found to positively correlate to all other variables. Agreeableness and conscientiousness were positively related to organizational commitment. Further, higher organizational commitment was associated with higher reports of perceived organizational justice and satisfaction. Organizational attitudes are crucial for an array of important functions, including workers' productivity, commitment, and retention (e.g. Schyns et. al. (2009); Meierhans, et.al. (2008); Moorman et. al. (1998)). Our study examined the relationship between supportive leadership, personality, and organizational attitudes of job satisfaction, job commitment, and perceived organizational justice with a goal to

provide meaningful contributions to the research literature in the fields of Industrial-Organizational Psychology, Human Relations, Management, and Business.

Golozar, Matin "*Computational Analysis of a Magnetophoretic-based Microfluidic Device*"

This research presents the modeling and optimization of a magnetophoretic bio-separation chip for the isolation of biomaterials, such as circulating tumor cells (CTCs) from the peripheral blood. The chip consists of a continuous flow through microfluidic channels that includes locally engineered magnetic field gradients. Highly non-uniform magnetic field gradients produced by an array of magnets exert attractive forces on magnetically labeled particles and pull them down as they travel through the fluidic channel. The computational model takes into account the magnetic and fluidic forces as well as the effect of the volume fraction of particles on the continuous phase to predict the trajectories and capture lengths of the bioparticles within a fluidic channel. Open-source software OpenFOAM was used to perform the particle-fluid transport and magnetic force simulations. Additionally, a parametric study is performed to study the effects of various parameters on the cell separation device and optimize its performance.

Idleman, Sara "*Identification of HCN Channels in Human Dental Pulp*"

Previous research has shown that pain can increase the hyperpolarization-activated cyclic nucleotide-gated channel 2 (HCN2) expression in the rat trigeminal ganglion. The purpose of our study was to determine expression HCN2 in healthy and symptomatic human dental pulp cells.

Jafari, Shabnam "*Primary Isotope Effect on the Secondary Kinetic Isotope Effects in Hydride Transfer Reactions: Isotopically Different Donor-Acceptor Distance"*

Many observations in hydrogen (H) transfer reactions cannot be explained by using the classical transition state theory. Rather, these reactions take place by H-tunneling effect in terms of H's non-classical wave property. Different isotopes have different wave property and this difference can have an effect on the 2° KIE. Previous 1°/2° Hydrogen coupled motion theory cannot explain the deflated 2°kinetic isotope effect (KIE) (as compared to the classically predicted value) in the case of D-Tunneling. A new theory that is able to explain the observation uses the concept that the donor acceptor distance (DAD) for D-tunneling is shorter than that for H-tunneling and as the result D-tunneling has a more crowded reaction site than H-tunneling. This latter crowding effect likely restricts the 2° H's vibration and causes a deflation in 2°KIE. Therefore, the 1° isotope has an effect on 2° KIE and the significant effect should be observed more in sterically hindered systems. We have designed several hydride transfer reactions in solution to test this hypothesis and our results support it. In this poster, we report our recent study of the 1° isotope dependence of 2° KIEs in another hydride transfer system. The results are

consistent with our previous observations further supporting the isotopically different DAD concept.

Jones, Hillery "*The Effects of Kenisthetic Art Making on Children's Mood State*"

Children can have a difficult time verbally expressing and identifying mood state and emotions. Kinesthetic art making and movement have been recognized to help identify mood and to allow for self-expression. This study examined the effects of kinesthetic art-making on children's mood state. There was a total of 26 participants. The ages of participants involved ranged from 7 to 12. The children participated in a quasi-experiment where they engaged in the kinesthetic art process. Pretest and posttest were used to identify the child participant's mood state before and after the kinesthetic art making process. The analyzed data revealed a significant change in children's calmness and mood states associated with positive feelings. This research project also includes personal reflections and experience from the researcher. This research project took place at the Creative Arts Summer Camp, hosted by Metro City Theater, located in St. Louis, MO.

Kaufman, Nichole "*Spectroscopic and Calorimetric Studies of Ca2+ binding to Dual Oxidase and NADPH Oxidase 5*"

How Ca2+ binding induces conformational change of the enzyme, including hydrophobic residue exposure, remains largely unknown. To elucidate the mechanism, the EFDs of NOX5 and Duox were expressed and purified using recombinant protein technology. Overall, the Ca2+ binding affinity is similar for both enzymes. However, their thermodynamic properties are essentially different. Isothermal titration calorimetry (ITC) measurement of Duox-EFD revealed an exothermic reaction followed by an endothermic reaction for the 1st and 2nd Ca2+ ion binding, respectively, where the binding exhibits negative cooperation. On the other hand, Ca2+ binding to the N-terminal of NOX5's EFD (NOX5 N-EFD), containing the same number of EFs, was overall exothermic and the two Ca2+ ions binding was somewhat independent. The rate of Ca2+ dissociation of Duox-EFD (1.44 s-1) is much slower than that of N-terminal NOX5-EFD (>300 s-1). Differential scanning calorimetry (DSC) studies revealed that Ca2+ binding also stabilized both enzymes with melting temperature difference (ΔTm) values of 16.8 oC, 30.4 oC and 38.2 oC for NOX5 N-EFD, NOX5 C-EFD and Duox-EFD, respectively. The Ca2+ induced hydrophobicity was assessed using 8-anilino-1-naphthalene sulfonic acid (ANS). The implication of the binding difference to their activation mechanisms is discussed.

Krisher, Jacob "*Cell-Matrix Interaction: Activation of MAP Kinase Signaling Pathway in Salivary Gland Cells"*

The extracellular matrix is a highly organized structure of all tissues and organs, which defines tissue organization and cellular function, amongst many other tasks. Salivary gland cells secrete and adhere to the extracellular matrix (ECM) for survival. However, during tumor progression and metastasis, salivary gland cancer cells secrete cancerous ECM, that promotes cells to survive. Cancer progression and survival is characterized by a complex reciprocity between these cells and the cancerous ECM. The goal of this study is to determine the role of cancerous ECM in the adhesion of normal salivary gland cells. For this purpose, we explored the use of the cancerous ECM of pleomorphic adenomas to culture normal salivary gland cells. Results from this study depicts the differentiation role of the cancerous ECM in transforming normal human salivary gland cells into a cancer specific lineage by activating the MAP kinase ERK1/2 signaling cascade. Overall, this study will help in designing an in vitro tool to study salivary gland cancer progression.

Lamb, Ashley "*Client Outlook in Alcohol Use Disorder and Schizophrenia*"

There is a marked amount of shame attached to the notion of being “mentally ill,” and a considerable portion of that shame appears to derive from the term itself. Although some negative stereotypes associated with mental illnesses have subsided over time, there are still substantial gains to be made in the area of stigmatized mental disorders labels (Reavley & Jorm, 2011). Language appears to have a significant impact on how individuals with mental illness perceive themselves, their illness, and their treatment. To date, there is little research that purports how “softer” versus more clinical terminology used for specific mental illnesses would affect treatment outlook for the client. Through the use of vignettes, this study examines an imaginary client’s outlook on aspects of treatment after receiving a diagnosis using either "soft," clinical, or unprofessional language. The purpose of this research is to determine whether the type of language used by mental health clinicians affects how participants view such things as the therapist, the accuracy of the diagnosis and the treatment. Specifically, this study focuses on common labels used when describing schizophrenia and alcohol abuse disorder. This study explored whether labels that are interpreted as accurate but less clinical (i.e. “soft”) are received more positively than more “harsh” but accurate clinical language and if both of these are received more positively than less professional, less accurate language.

Maves, Mallory "*Sexual Harassment, Who's the Real Victim?"*

Sexual harassment is viewed as negative by either sex especially when an agentic female leader is the instigator. The existence of harassment and how it affects a female in power’s likeability was examined in a sample of 84 participants at a Midwestern University. In this study, it was hypothesized that female on female harassment would be viewed less harshly than female on male harassment. Additionally, the likeability of a female in power would go down when she

harassed either sex. Participants were asked to view 4 videos depicting various situations of harassment or no harassment. A 2X2 ACNOVA was used to determine results of harassment on employee gender. Results of the study showed a significant effect in that female on female harassment was actually viewed more harshly than female on male harassment. However, the female's likability still remained low when she harassed either gender (male or female subordinate). Implication of this study involve different approaches to sexual harassment training and further the understanding for why the gender gap still exists in the workplace.

Mazgaeen, Lalita "*Differential RNAi Approaches to Enhance Knockdown Efficiency of Target Gene Transcripts in the Highly DDT-resistant 91-R Strain of Drosophila Melanogaster*"

Ribonucleic acid interference (RNAi) is a sequence-specific post-transcriptional process of gene silencing mediated by RNA-inducing silencing complex (RISC). Double-stranded RNA (dsRNA) has been widely used to knockdown transcription of the targeted gene of insects. Two techniques, feeding and injecting dsRNA, have been commonly used to treat insects for functional validation of genes because of simple and easy manipulations with satisfactory efficiencies of suppressing gene expression. However, these approaches often failed to produce anticipated down-regulation of the target genes in Drosophila melanogaster. For down-regulation of the hard to knockdown Cyp4g1 gene that is associated with DDT resistance in the 91-R strain of the D. melanogaster, female flies were treated with Chitosan-dsRNACyp4g1 nanoparticles that were formed by self-assembly of polycations with dsRNA. The Zeta-sizer reading showed the diameter of chitosan nanoparticles ranging from 150-200 nm. The knockdown bioassays were performed using the DDT coated vial (1µg/vial) exposure method. Female flies treated with Chitosan-dsRNACyp4g1 nanoparticles exhibited 1.5-fold decreased KT50 compared to the female flies treated with Chitosan-dsRNArp49 nanoparticles ($\chi 2 = 11.68$, $df = 2$, $p < 0.05$). Similarly, flies treated with selenium-PAMAM dendrimer-dsRNACyp4g1 nanoparticles showed 1.43-fold decreased KT50 when compared to flies treated with selenium-PAMAM dendrimer-dsRNArp49 ($\chi 2 = 13.81$, $df = 2$, $p < 0.05$). This suggests that nanoparticles used to treat flies enhanced cellular uptake of dsRNA and facilitated the decrease in transcript level of the target gene. These results will be validated using quantitative real time PCR.

Mincy, Callie "*Effects of Cancerous Matrix on Normal Salivary Gland Cells*"

Effects of Cancerous Matrix on Normal Salivary Gland Cells / Callie Mincy, Shannon Payne, Seth Barnett, Asha Eapen / The extracellular matrix (ECM) of cancer cells plays an important role in malignant tumor growth. Cancer cells matrices are disorganized and can act as a scaffold necessary for tumor growth, progression and metastasis. In this study, we explore the use of ECM from human salivary gland cancer cells to induce and study morphological changes in normal human salivary gland cells. Normal human salivary gland cells (HSG) were seeded on the cancerous ECM of salivary gland cancer cells (HTB-41). The objective of the current research proposal is to understand the Smad2/3 signaling pathways that regulate the

morphological changes in human salivary gland cancer. The long term goal is to explore and study the use of ECM as a tumor-induction model for salivary gland cancer progression.

Muzumdar, Prathamesh ***"A Descriptive Exploration of Segments in Financial Services Sector: Customer Experience Study"***

Customer satisfaction is an important factor to measure the product efficiency of a brand. In financial services where the intangibility of the product plays an important role for the success of the company understanding the importance of customer satisfaction measurement has become an need. The study explores the relationship between satisfaction and recommendation in financial service sector where loyalty programs have become a center of attraction for customer retention. This study was an ad-hoc market research study conducted in a single cross sectional design using web-based survey. This study was able to explore different loyalty segments in the financial services sector and understand the customer insights on satisfaction and recommendations. Highly likely recommenders are seen very satisfied with the travel and cash rewards programs, though the opportunity to switch to competitor brands is seen very high for business rewards programs. The recommendation and satisfaction levels differ across multiple programs and are seen to go parallel with personal needs rather than professional needs. Overall, the study moves into multiple venues each exploring different aspects of loyalty in a volatile market of financial services.

Najafi, Firouzeh "*Investigation of the C-5 effect in Hydrogen-bond-mediated Aglycone Delivery (HAD)*"

N-Acetyl-neuraminic acid is the most abundant member of the sialic acid family. Sialic acids are very important biologically. For example N-acetylneuraminic acid is the cellular receptor for influenza virus, as well as having an important role in tumor cell metastasis. The synthesis of sialic acid containing glycoconjugates occurs through a glycosylation reactions that ideally should lead to the natural α glycosidic linkage. To improve the efficiency in sialylations C-1, C-2, C-5 modification have been investigated. In particular, C-5 modification have been the most promising. As a part of a research goal directed into optimizing current methodologies in sialylation reactions, herein we report the synthesis and testing of C-5 modified thioethyl sialyl donor bearing a picoloyl group at C-4.

Payne, Shannon "*Active TGF-β Signaling in Salivary Gland Cells*"

Salivary gland cancer is the most common malignancy of the oral cavity. Molecular mechanism underlying the differentiation, invasion and migration of salivary gland cancer cells remains unclear. Dentin Matrix Protein 1 was initially expressed in tooth and bone. We have previously demonstrated that upregulation of Dentin Matrix Protein 1 (DMP1) in salivary gland cancer cells

can activate known cancer specific markers. However, the mechanism by which DMP1 transduces this activation still remains a mystery. In this study, we determine the mechanism by which transforming growth factor beta1 (TGF-β1) enhances the activation of cancer specific markers in DMP1 overexpressed salivary gland cells. Results from this study suggest that TGF-β1 stimulates the activation of cancerous markers through the Smad2/3 signaling cascade.

Rab, Md Abdur "*Identifying the Best Practices for Pedestrian Safety at Uncontrolled Crosswalks"*

Pedestrians have the right-of-way when crossing the roadway at crosswalks, but there is a lack of consistent safety treatment deployment practices at locations where vehicle traffic is not controlled by stop signs or traffic lights. This study intended to identify the best practices for improving pedestrian safety at crosswalks where vehicle traffic is uncontrolled. To identify these best practices the researchers first reviewed past research findings on different treatments related to pedestrian safety. Next, the researchers interviewed personnel at the Illinois Department of Transportation. Last, the researchers conducted an online survey of City Engineers' in different Illinois District's. Review of past studies found that limited national-level guidelines were available on pedestrian crossings warrants and design at mid-block and un-signalized locations. Many of the interviewees referred to Manual of Uniform Traffic Control Device (MUTCD) (91%) and the Bureau of Design and Environment Manual (73%) for pedestrian crossings design guidance. All the survey respondents reported to use MUTCD and suggestions from consultant engineers, and many used personal experience/preference (90%) for crosswalks design. Past studies generally agree that the following treatments can improve pedestrian safety at crossings: Zigzag Pavement Markings; Refuge Islands; Danish Offsets; Advanced Yield Lines; In-street Crossing Signs; Flashing Beacons, including Pedestrian Hybrid Beacons, Rapid Rectangular Flashing Beacons, and Pedestrian User-Friendly Intelligent; and In-roadway Warning Lights. All the interviewees reported to consider signage, supplemental signage, standard striping and flashing beacons to improve pedestrian safety at uncontrolled crossings. Of the survey respondents, 92% were found to consider signage, supplemental signage, and crosswalk lighting for pedestrian safety at crossings. The findings of this study overall support the need for developing a guide for transportation practitioners throughout Illinois to inform practice with the latest research on the effectiveness of various safety treatments.

Roberts, Sarah "*Investigating Recognition Rate of Affect Displays in a Humanoid Robot with Limited Modalities of Expression*"

Emergent research in the domain of socially assistive robots (SAR) as a treatment platform for interventions in clinical and educational settings suggests that an interactive humanoid robot has significant therapeutic potential and often leads to improved treatment outcomes (Rabbitt 2014, Feil-Seifer and Mataric 2005, Tapus and Scassellati 2007). The current study is interested specifically in the role of emotion in human-robot interactions (HRI). The goal of this work is to achieve predictable displays of posture and gesture utilizing existing motor system mechanisms,

or skeletal structure, as a communicative modality to demonstrate a base set of emotions. The research method collects metrics from participants to gauge the believability of emotive displays exhibited by a robot agent with limited expressive modalities. This research builds on existing approaches to improve recognition rate of body language in the humanoid robot NAO and to develop a platform-specific framework for modeling emotion utilizing a more systematic coding of components that contribute to the recognition and believability of displays (Beck, Hiolle, Mazel and Canamero 2010, Beck, Canamero, and Bard 2010, Dael, Mortillaro, and Scherer 2012, Greczek and Swift-Spong 2011, Itoh et.al. 2004). The results of this work will be used in the development of applications for the treatment of social, emotional, or behavioral disorders or psychiatric disabilities in children and for use in classrooms as a supplement to existing social emotional learning (SEL) curriculums.

Shaw, Amy "*Psychological Capital in the Pediatric Intensive Care Unit: An Intervention to Enhance Nursing Communication, Empowerment, and Wellbeing"*

Nurses are integral to the delivery of high quality healthcare and provide that care in a compassionate, deliberate, and expert manner, while balancing the demands of a complex care environment. Ideally, nurses derive fulfillment from caregiving, but they often leave the profession due to role stress, inadequate communication, and poor team dynamics. In this setting, many nurses are at risk for experiencing work-related stress and burnout. The Broaden-and-Build Theory of Positive Emotions provides the theoretical basis for this project. Positive emotions enable individuals to “broaden” their response to a situation to encompass increased creativity, cognition, and the capacity for personal growth (Fredrickson, 2001). The development of positive emotions results in resilience and personal wellbeing. Work-related stress may interfere with the development and maintenance of positive emotions. Psychological capital (PsyCap), a strength-based approach to develop greater capacity for resilience, optimism, self-efficacy, and hope, is based on Positive Psychology (Avey, Luthans, & Jensen, 2009). Brief PsyCap interventions have led to increased employee communication, engagement, and wellbeing. The purpose of this project is to identify work-related stressors experienced by hospital nurses in the Pediatric Intensive Care Unit (PICU) and to evaluate the efficacy of the evidence-based PsyCap intervention to empower this population to combat work-related stress, enhance nurse communication, engagement, and wellbeing. PICU nurses at a Mid-Western academic pediatric hospital were invited to participate in focus group discussions and then, later, a PsyCap intervention. The focus group discussions explored stressors experienced by the PICU nurses and provided guidance for a customized PsyCap intervention. The Conditions of Work Effectiveness Questionnaire (CWEQ-II) and Psychological Capital Questionnaire (PCQ) were administered pre- and post-intervention. Demographic data and pre/post data was analyzed using descriptive statistics and paired t-tests to examine the effects of the PsyCap intervention on the participants’ perceptions of their ability to cope effectively with work-related stress and their psychological measures of resilience, optimism, self-efficacy, and hope. PsyCap development is a viable resource to enhance nurse communication, empowerment, and wellbeing.

Skopljak, Alen "*Testing the Predictive Qualities of Grit in Graduate School*"

The number of students applying to/entering graduate programs continues to increase and the ability of current predictors to predict success remains low (Darley, Zanna, & Roediger, 2004; Morrison & Morrison, 1995; Patton, 2013). Additionally, with graduate school completion taking years of dedication, there is a need for a predictor that takes this long-term focus into account (Sheridan & Pyke, 1994). Luckily, over the past decade, there has been a rise in interest regarding a new construct called "grit", which is related to success in long-term goals and is defined as passion and perseverance for long-term goals (Duckworth & Carlson, 2013; Duckworth, Peterson, Matthews, & Kelly, 2007; Eskreis-Winkler, Duckworth, Shulman, & Beale, 2014). Studies have shown that grit was related to lifetime educational success (Duckworth & Quinn, 2009), professional success (Baum & Locke, 2004; Locke & Latham, 2013; Vallerand, Houlfort, & Forest, 2014; Wrzesniewski, 2012), likelihood of public school graduation (Eskreis-Winkler, Shulman, Beale, & Duckworth, 2014), and the likelihood of teacher retention and their effectiveness (Duckworth & Quinn, 2009; Robertson-Kraft & Duckworth, 2014). Despite the findings of a positive relationship of grit in academia (educational success and graduation), it has not yet been evaluated against graduate school success. Therefore, this research hoped to advance knowledge on the ability of grit to predict graduate school success, specifically in relation to 1) graduate grade point average, 2) thesis completion, and 3) graduation. Former graduate students were asked to fill out online questionnaires evaluating their grit levels and these were correlated with their graduate school outcomes. Results, limitations, and future research directions will also be discussed.

Southard, Houston "*The Advantage of Hypocrisy: Using Dissonance to Improve Exercise Habits and Reduce Stress*"

Hypocrisy-induction is a recent form of cognitive behavioral therapy that serves as a cognitive wake-up call to create prosocial behavior change; namely, stress reduction through exercise. Exercise is used as the focus of this study's cognitive behavioral therapy, because although it has long been utilized in stress therapy, what motivates exercise is less clear (Weinberg & Gould, 2013). The current study seeks to generalize the current literature on hypocrisy-induction by applying its methods to increasing individuals' exercise habits in order to reduce stress. The study also predicts that those with higher self-esteem will be more affected to exercise through the intensity of hypocrisy induction, and that exercise will mediate the relationship between hypocrisy-induction and perceived stress. Methods: A laboratory study was developed to measure the differences in physical exercise and perceived stress between those who had their hypocrisy induced and those who didn't. Hypocrisy was induced by having participants in the treatment condition make pro-attitudinal speeches about exercise into a video camera, and journaling about past failures to engage in exercise. A four-week follow-up measure was given to provide objective data for these relationships. Results: Correlational analysis revealed that physical exercise was negatively related to stress and that hypocrisy induction was related to both exercise and perceived stress. A moderated hierarchical regression revealed that self-esteem moderated the relationship between hypocrisy induction and exercise, and a mediated regression revealed that physical exercise mediates the relationship between hypocrisy induction and

perceived stress. Conclusions: These findings demonstrate that hypocrisy induction generalizes beyond its previously studied prosocial behaviors of smoking-cessation and HIV-prevention, and informs corporate wellness interventions and their future applications.

Thompson, Samantha "*Motivations for Explorers: Shifting Viewpoints from the Middle Ages to the Early Modern Period*"

This project aims to track a shift from medieval explorers to Early Modern explorers. Using Marco Polo as an example for travel narratives in the Middle Ages and Jacques Cartier as an example for the Early Modern Period, the goal is to demonstrate such a shift through their motives for exploration. By contrasting their discussion of the peoples they encounter and the geographical information they provide, a transition becomes clear. Marco Polo's travel narrative illustrates a merchant or ambassador motive without influence from the Venetian government. Cartier's narrative showcases a wealth seeking operation for the good of King Frances I. Though focused in the past, this research will explore the effects of globalization and the systems that were developed to handle them.

Umbaugh, David "*The Effects of a High-Fat Diet on Neuronal Inflammation"*

The overall aim was to identify neuronal inflammation as a potential mechanism underlying the pathogenesis of high-fat diet-induced neuropathy. These experiments tested the hypothesis that a HF diet induces neuronal inflammation. Male C57Bl/6 mice were randomized to two groups and fed a standard (Std) or high-fat diet (HF) for 8 weeks. The lumbar dorsal root ganglia (DRG) were harvested and inflammatory mediators (IL-1α, IL-1β, IL-2, IL-3, IL-4, IL-5, IL-6, IL-10, IL-12p70, IL-17, MCP-1, IFN-γ, TNF-γ, MIP-1α, GMCSF, and RANTES) were analyzed using a Multiplex ELISA. Neuropathy was characterized using the von Frey test for hindpaw mechanical sensitivity at baseline and every other week thereafter. At the end of the 8 wk intervention, the HF fed mice had significantly higher bodyweight and fasting blood glucose levels. Hindpaw mechanical sensitivity was not significantly different between groups at any timepoint. However, hindpaw mechanical sensitivity trended toward an increase from baseline (56.3 ± 0.05%) to wk 8 (70.8 ± 0.06%) in HF ($p = 0.055$) compared to Std (baseline: 56.9 ± 0.05% ; wk 8 : 61.4 ± 0.07%). MCP-1 was significantly higher in HF compared to Std after the 8 wk intervention. Although hindpaw mechanical hypersensitivity is characteristic of HF feeding in mice, the mild increase in hindpaw mechanical sensitivity did not reach statistical significance in this cohort. The HF fed mice exhibited elevated MCP-1 levels compared to Std fed mice which is suggestive of diet-induced inflammation. MCP-1 is understood to play a crucial role in the recruitment of inflammatory mediators, which suggests diet-induced inflammation may play a role in establishing neuropathy.

Uppala, Ranjitha ***"Effects of Chemical Speciation on Selenium Accumulation in Fungal Mycelia***

Selenium (Se) containing glutathione peroxidase and thioredoxin reductase enzymes play important roles in detoxification and antioxidation in human body. Selenium deficiency may cause serious health complications in humans. Thus, the development and uses of Se-biofortified food products recently becomes one of the agricultural research topics. Edible mushrooms are rich in proteins and essential amino acids, and some are capable of accumulating micronutrient elements like Se. This laboratory study was conducted to determine the feasibility of producing Se-enriched mushroom mycelia through tissue cultivation and effects of different chemical forms, including element Se nanoparticles, on Se accumulation in mycelium tissues of different mushroom species. The results showed that significant amounts of Se were accumulated in mycelium tissues, and Se bioaccumulation varied significantly ($p<0.05$) among the mushroom species, including Reishi (*Ganoderma lucidum*), Shiitake (*Lentinula edodes*), Hericum (*Hericium erinaceus*), Pearl Oyster (*Pleurotus ostreatus*) and Blue Oyster (*Pleurotus columbinus*). The highest Se concentration (315 mg/kg) was observed in Blue Oyster mycelia. Concentrations of Se accumulated in mycelium tissues of Reishi and Blue Oyster increased with increasing the level of Se treatment in growth media, from 1, 2.5, 5 to 10 mg/L and in the form of selenate (Na_2SeO_4) or elemental Se nanoparticles (SeNPs). The mycelium growth was significantly inhibited by Se in selenate at the treatment level of 20 mg/L, while the 1 mg/L treatment significantly enhanced the mycelium biomass production compared to the control.

Wang, Jun ***"Microbial Transformation and Volatization of Elemental Selenium Nanoparticles"***

With rapid development of nanotechnology, selenium (Se) nanoparticles (SeNPs) have been widely used in many different fields, such as medical, agricultural, and nutritional industries. Due to their unique physical and chemical properties, SeNPs as emerging contaminant could pose potential adverse impacts on the environment. Little is known about the chemical behaviors of SeNPs in a soil-plant system, and particularly the biological processes that control the transport and fate of SeNPs in the environment have not been well elucidated. To demonstrate that SeNPs can be bio-transformed in soil-plant systems, a series of laboratory experiments have been conducted using Se-hyperaccumulator plant *Stanleya pinnata* and the plant associated soil bacterium *Pseudomonas fuscovaginae*. The results showed that soil microbial Se volatilization was the dominant process for Se volatilization in the soil-plant system that was treated with 3 mg/kg SeNPs, and further the amount of Se volatilized from roots (88.64±10.62 µg/pot) was significantly higher than from shoots (0.21±0.86 µg/pot). The rate of Se volatilization from SeNPs by *P. fuscovaginae* is Se-concentration dependent. With the Se treatments of 1, 5, and 10 mg/L in bacterial growth substrate, rates of Se volatilization during a 24-hour sampling period was 0.14±0.11 µg/flask, 1.06±0.19 µg/flask, and 1.44±0.11 µg/flask, respectively. The amount of Se volatilized from SeNPs by the bacterium was lower than from sodium selenate, but higher than the volatilization from bulk elemental Se. This study indicated that SeNPs are bioavailable and can be bio-transformed to volatile Se compounds. Soil rhizosphere bacteria play an important role in Se volatilization from SeNPs.

Wilson, Daniel ***"Reactions to Transgender Job Applicants: Implications of Gender Orientation on Hiring Decisions, Salary Recommendation, Agency, and Communality"***

In recent years, growing attention has been paid to the subtle forms of discrimination towards disadvantaged groups that occur in the work place. The result has been a growing understanding of the underlying stereotypes and biases that affect social interaction and decision-making. However, there is currently still a dearth of research addressing the stereotypes that affect transgender individuals in the workplace. This is of particular concern as sources suggest transgender individuals often feel as though their identity hinders their employment opportunities (Sears & Mallory, 2011) This study seeks to address that issue by examining perceptions of agency in the decision to hire an openly transgender job applicant. Perceptions of agency, likened to assertiveness and linked with traditional views of masculinity, can negatively affect employees if the perception is seen as incongruous with the individual's demographic status (Heilman, 2001; Eagly & Carou, 2002). The present study will examine this by having individuals rate their impression of a job applicant's agency and eligibility for a provided position. Results may suggest that implicit stereotypes held regarding transgender individuals can play a role in determining suitability for hire."

Yeager, Brandon "*Identification of 1, 5 Anhydroglucitol in Saliva"*

The purpose of the study was to determine levels of salivary 1, 5-anhydroglucitol (1, 5-AG) using an enzyme linked immune assay (ELISA) and to compare salivary 1,5 AG levels with HbA1c levelsin diabetic and non-diabetic patients. Our hypothesis was that 1, 5-anhydroglucitol is detectable in human saliva, is decreased in diabetic patients and lowest in uncontrolled diabetic patients.

Yobby, Jason "*Cost Effective Optimization of Component Improvements of a Turbofan Engine Using Genetic Algorithms"*

In this project, we are examining an underperforming prototype of a real high bypass-ratio turbofan gas turbine engine that has been assembled to specifications, to generate a predetermined specific thrust with a predefined specific fuel consumption value. To meet the required performance targets, improvements need to be made to one or more of the engine components. The overall engine performance improvement is tied to percentages of improvements of each component in the engine. There is room for improvement in each or the components, but the improvements, however, come with high costs since the engine had been designed in efficient way to begin with. The cost of improvement in each component is indexed by a dollar cost per percent value of the component performance characteristics. It is of technical and economic importance to find a combination of performance improvements on each of the components that yields the lowest overall cost, given the specified engine performance criteria. To achieve this goal, simulations for a real gas turbine turbofan cycle are performed in conjunction with the genetic algorithm (GA). A single objective GA with two constraints and

eight degrees of freedom is employed to find the component improvement percentages with the least improvement cost. / A plan of improvement combination of all the components, with a given component improvement cost index, was found as a result that yielded the least cost. The simulation results successfully demonstrated the viability of GA method applied to practical problem with multiple degree of freedom and with multiple constraints.

Young, Stephanie "*Stigma, Perception of Control, and Mental versus Physical Illness*"

This study aimed to explore the relationships between perception of control and stigma towards individuals diagnosed with a mental illness versus a physical illness. The purpose of this study was three-fold: 1) hypothesis one predicted that our sample would stigmatize mental illness more so than physical illness; this was a replication of well-established findings, 2) hypothesis two predicted that our sample would view mental illness as more under the control of the patient than physical illness; this aimed to replicate less established findings, and 3) hypothesis three predicted a positive relationship between the amount of perceived control and the amount of stigma felt toward someone with an illness regardless of the type of illness, but that this relationship would be stronger for mental illness; this was a unique aspect of this study. Participants consisted of undergraduate students enrolled in Introductory to Psychology courses at a mid-sized Midwestern University in the spring of 2016. The participants read a vignette that featured a fictional male college-aged student who was experiencing symptoms of one of four illnesses. The vignettes only differed in the type of illness presented (mental = Generalized Anxiety Disorder and Bipolar II Disorder; physical = Hyperthyroidism and Fibromyalgia) and the severity of the symptoms (mild or severe). Participants were then asked to complete two questionnaires regarding perceived controllability and stigma towards the individual in the vignette. At this time, roughly 80% of the data has been collected; all data will be collected and analyzed for presentation at the Graduate Symposium.

Yu, Charlene "*Effect of Monochloroacetyl in Sialylation Reactions*"

Sialic acid is a family of around 50 natural occurring 2-keto-3-deoxy-nononic acids, with N-acetyl neuraminic acid being the most ubiquitous. Sialic acids are involved in a wide variety of biological phenomena, and therefore the chemical synthesis of sialic acid containing glycoconjugates is an essential tool for the design of therapeutics. In spite of the tremendous advancement in sialic acid chemistry in the last decades, the stereoselective synthesis of sialic acid glycoconjugates is still a challenge.

Little is known about the effect of O-protecting groups, while an extensive investigation has been focused on the C-3 and C-5 effect. Herein we report the synthesis of C-4 modified sialyl donors and their testing in sialylation reactions for the synthesis of a(2-6) glycosidic bonds in several reaction conditions.