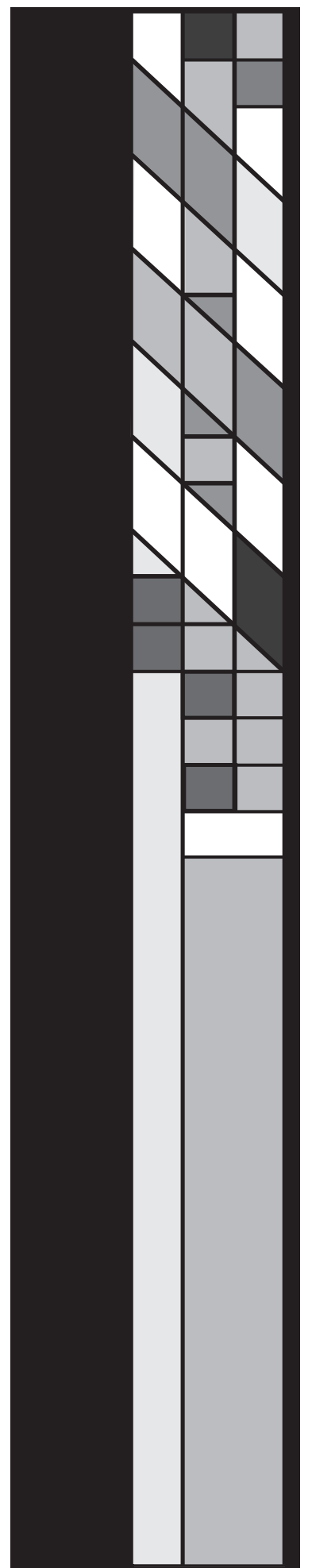


GRADUATE ABSTRACTS

SCHOLARS WEEK
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Physical Activity Level and Body Mass Index In a Native Hawaiian Adolescent Population

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Native Hawaiians (NH) have the highest prevalence of obesity in Hawaii, as determined by body mass index (BMI). While approximately 61% of NH adults report meeting daily physical activity (PA) recommendations. These inconsistent statements give rise for concern in this population. Additionally, few data are available regarding obesity and physical activity levels in NH adolescents. To address this concern, 69 adolescents from two middle schools on the island of Maui completed two physical activity recall surveys and height and body mass were measured to calculate body mass index (BMI). Recommendations for moderate and vigorous PA were met by 37% and 44% of participants, respectively. Using the International Obesity Task Force cutoffs for BMI, 44.9% of children were of normal weight, 30.4% were overweight, and 24.6% were obese. Interestingly, the overweight group reported the highest levels of PA. In conclusion, compared to national averages, NH adolescents reported lower levels of vigorous PA, higher levels of moderate PA, and higher rates of overweight and obesity.

Creativity and Sleep Disturbance

Brad Ferguson (graduate student), MTSU Psychology; Valeria Drago (faculty), University of Florida

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OBJECTIVE: Disturbance of the noradrenergic and serotonergic systems is known to give rise to sleeping disturbances. Additionally, these neurotransmitter systems are also implicated in creative processes. For instance, administration of propranolol, a beta-adrenergic antagonist, has been found to enhance cognitive flexibility. Further, creative individuals have been found to possess significantly lower concentrations of both norepinephrine and dopamine relative to individuals with lower creativity. We sought to investigate whether individuals with sleep disturbance have increased creativity. We predicted that sleeping problems would be associated with increased creativity. **METHODS:** Reported sleep quality (Pennsylvania Sleep Quality Index; PSQI), a behavioral measure of creativity (Abbreviated Torrance Test for Adults; ATTA), a self-report measure of creative attributes (Scale of Creative Attributes and Behavior; SCAB), and level of depression (Beck Depression Inventory-II; BDI-II) were obtained in a sample of 54 individuals (25 men and 29 women) with an age range of 18 to 30 years ($M = 19.65$, $SD = 1.84$) at Middle Tennessee State University. **RESULTS:** Regarding the ATTA, those who reported low sleep quality (LSQ) scored significantly higher on Activity One (verbal creativity) relative to those reporting high sleep quality (HSQ). As well, scores on the SCAB were significantly higher for the LSQ group relative to HSQ. **CONCLUSION:** These results indicate that individuals with poor sleep quality have increased creativity. Specifically, individuals with poor sleep quality scored higher than those with better sleep quality on a questionnaire that assesses creative thinking. Additionally, poor sleep quality was associated with higher scores on Activity One of the ATTA, which is the verbal creativity task. The reason poor sleep quality is associated with increased creativity, and in particular verbal creativity, may be related to balance models of brain functioning and the asymmetrical distribution of norepinephrine and serotonin.

The Effect of 8-week of Resistance Bands Training on Upper Body Muscular Endurance of Sixth-Grade Students

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The purpose of the study is to investigate the effects of resistance bands training on upper-body muscular endurance of elementary school children. Fifty (n=50) sixth-grade students from Homer Pittard Campus School in Murfreesboro, Tennessee are participating in the study. Participants will be assigned to two groups: a resistance bands training group (RBT) and a control training group (CT). An equal number of participants will be included in each group. The resistance bands training group will complete a series of resistance bands exercises that will include upper body muscular endurance (chest press, shoulder press, rowing) for 10 to 15 minutes. Each exercise will consist of 1 to 2 sets of 10-12 repetitions. Sets and repetitions will be increased each week. The control training group will continue with the regular physical education schedule which will include team sports and skill-theme activities. The resistance bands training group will train three times a week for a period of 8 weeks. A push-up test to measure upper-body muscular endurance will be administered the first week and the last week of the program. A Pre-test/Post-test Group Design will be used to investigate if the number of push-ups between the two groups are different from pre-test to post-test, and if such difference is due to the training methods.

Digital Elevation Model of the Battle of Peleliu

Bethany Hall (graduate student), Public History; Mike Curtis (community member)

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A map will be presented that represents the World War II Battlefield of Peleliu, an island that is a part of the Republic of Palau located in the Central Pacific Ocean. The mapped features were created using ESRI's ArcGIS 3D Analyst with 1 meter topographic contour lines to construct a three-dimensional model of the island. It is then draped with scanned copies of the troop battle movement maps from both Japanese and American units and then these positions were mapped as points. Other additional data included is the 500+ Japanese Cave Defensive System that required troops from both the United States Marine Corps and the Army to disarm with small arms fire and flamethrowers.

Seroprevalence of *Trypanosoma cruzi* in Raccoons in Tennessee

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Trypanosoma cruzi is the causative agent of Chagas disease which affects 8 to 11 million people in Latin America. It also causes infection in wild and domestic mammals and is transmitted by several species of blood feeding reduviid insects known as kissing bugs. Autochthonous infection of humans in the United States is rare with only six cases reported from California, Texas, Tennessee, and Louisiana since 1955. However, *T. cruzi* has been detected in a number of wild and domestic mammals in the southeastern U.S. Although the parasite is present in Tennessee, little is known about the ecology and the risk of transmission of *T. cruzi* among humans and animals. The purpose of this study was to examine raccoon serum for the presence of antibodies to *T. cruzi* using the indirect fluorescent antibody (IFA) assay to better understand the prevalence, transmission dynamics, and infection risk of *T. cruzi* in Tennessee. Raccoon serum samples from 10 eastern counties were collected from 2005 to 2007 by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services program and deposited at the Tennessee Department of Health Vector-Borne Disease Laboratory. Of the 704 samples tested, two hundred and seven (29.4%) were seropositive based on an IFA titer of 1:64. Nine of the 10 counties surveyed have yielded raccoon serum that is positive for antibodies to *T. cruzi*, ranging from 14.6 to 63.6% seroprevalence per county. Seven kissing bugs, 5 from DeKalb County and 2 from Davidson County, were tested for the presence of *T. cruzi* using PCR. Four of the seven (57%), two from each county, were PCR positive for *T. cruzi*. Since infected kissing bugs are vectors of *T. cruzi*, and peridomestic raccoons may serve as reservoirs for *T. cruzi*; raccoons and kissing bugs are potentially a source of exposure risk for humans and domestic mammals.

Exploring the Relationship Between Rape Supportive Attitudes and Competitiveness Among College Students

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This study intends to examine various attitudes among college students using the psychology research pool and convenience sampling. This study will consist of 300 Middle Tennessee State University students between the ages of 18 and 26. Results will be discussed in terms of prevention of assaults on college campuses. Students will be asked to complete two questionnaires that relate to their attitudes on sex and competition and some basic demographic information, (e.g., age, gender). No personally identifying information will be included on the questionnaires. All information will be collected on the campus of Middle Tennessee State University. Data collection will take approximately 20-30 minutes of their time and they will receive one 30 minute credit if they participated from the psychology research pool.

Organic Chemistry Textbooks: What Students Think Really Matters

Elliot Ennis (graduate student), Chemistry; Scott Handy (faculty), Chemistry

Michael Sanger, Chemistry; Amy Phelps (faculty), Chemistry

Mentor - Scott Handy, Chemistry, shandy@mtsu.edu, 615-904-8114

As a companion to an earlier survey of organic chemistry professors on the topic of textbooks, students enrolled in the organic chemistry sequence at Middle Tennessee State University during the 2007-2008 academic year were sent an online survey using Survey Monkey, an online survey program. Students were asked to comment on their experiences with the course material and their feelings about the textbook. Students were also asked about their study habits, feelings about online homework, and how to make the textbook more reader friendly. Additionally, students were given the opportunity to comment on things they wish to see changed in their textbook. This report summarizes the results obtained thus far.

How To Build A Better Mouse Trap: Sanitation Issues In The Food Industry

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Food safety has become one of the top priorities of the modern era. There has been a demand for more regulation of food safety. Sanitation programs are set up in a company to prevent contamination. A company's sanitation program was investigated in three definitive aspects. The actual sanitation process and how clean the product starts out. The personnel and their equipment may also impact bacterial growth. The third aspect that was investigated was the actual product and where the product was being produced. The results indicate that the equipment was not being cleaned on a schedule. The plant that produced the product had an impact on the bacterial growth. Personal equipment was not being maintained either. This would suggest that a monitoring system for all three areas is needed to maintain the appropriate level of safety in this industry.

An Assessment of Stereotypes Related to the Psychology Degree

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Very little research examines stereotypes applied to students who major in psychology. This study examines how often students have heard specific stereotypes regarding students who major psychology. Using students from the Psychology Department's Seminar on Careers in Psychology course, we first used online class discussions to generate specific stereotypes that psychology students had heard. The identified materials included stereotypes about what one can and cannot do with a psychology degree, how much education is required to work in the field, and various personal characteristics of the majors themselves. Using this generated list, we then surveyed students in the course on how often they had heard each stereotype from both their friends/peers and their parents/family members. Results will show which stereotypes are more frequently encountered by psychology majors and also address whether peers and family members differ in their conceptions of the field and major. Data are currently being analyzed. Implications of the findings will be presented for psychology advising and the influence of peers and parents on students' attitudes toward their discipline.

The Effect of Joint-Child-Custody Legislation on the Child-Support Receipt of Single Mothers

Brandeanna Allen (graduate student), Economics and Finance; John Nunley (faculty), Economics and Finance; Alan Seals (faculty), Oklahoma City University, Economics

Mentor - Charles Baum, Department of Economics and Finance 615-898-2527, cbaum@mtsu.edu

Due to the preponderance of single mothers on public assistance, delinquent child support has been a contentious political issue in the U.S. for over 30 years. We examine whether joint-child-custody reform affects the child-support receipt of single mothers. We use variation in the timing of joint-custody reforms across states to identify the effect of joint custody on the child-support receipt of single mothers. Joint-custody enactment raises the probability of receiving child support for all single mothers by six percent. However, the effect on all single mothers is driven by the effect on divorced mothers since separated and never-married mothers are unaffected by joint-custody reform. We conclude joint-custody reform confers the most benefit on divorced mothers and their children, particularly those who do not receive public assistance.

A Comprehensive Analysis of the Effect of Mandatory Waiting Period Restrictions to Abortion

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Laws which require women to wait a specified period of time before obtaining an abortion increase the financial and emotional costs of having an abortion. This paper examines the impact of mandatory delay restrictions on several outcomes related to fertility. Although the first state adopted mandatory waiting period laws in 1992, a preexisting downward trend in abortion rates since 1980 complicates the estimation of these law changes. I use 30 years of state-level panel data and various estimations to capture any preexisting trends in the data. My results show the effects of mandatory waiting period laws do not significantly affect abortion rates. However, the laws do affect fertility behavior by decreasing birth and pregnancy rates. Earlier restrictions to abortion have been shown to affect adoption and child abuse rates; however, I find no effect of mandatory waiting period laws on either outcome. Contrary to existing literature, my results also show mandatory waiting period laws do not significantly affect female suicide rates.

A Theoretical Model of Contract Choice in the Recorded Music Industry

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Mentor - Christopher Klein, Economics and Finance, cklein@mtsu.edu, 615-904-8570

The music industry has experienced drastic change in recent years. In response to changes in media platforms, artists have begun restructuring their relationships with labels. It appears that record companies are also ready to look to the future rather than simply fighting to maintain the status quo. One approach that some artists and record companies are embracing is a new type of contract known as “360.” This contract format is a completely different way of doing business for the industry. Artists under a 360 contract share all revenues with their label, not just record sales. Revenue streams such as concert tickets, publishing royalties, endorsement deals, and merchandise sales will now be shared with the label. The argument for 360s is that, even though consumers may only purchase a couple of singles, they will still want to attend concerts and buy merchandise. This paper will develop a simple theoretical model which can be applied to three different types of contract between an artist and a recording firm: the traditional contract, the 360 contract, and remaining an independent artist with no record contract. I will analyze the optimal prices and payoffs for each type of contract.

Affect and Horizontal Position

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Previous research has shown that metaphors linking affect and vertical positioning influence judgments, but no research has examined the relationship between affect and horizontal positioning. Two studies were designed to test the hypothesis that metaphors linking affect and horizontal positioning may also influence evaluations. In study one, participants verbally evaluated 100 words as being positively or negatively valenced. After each evaluation, a number (4 or 6) appeared on the top or bottom of a screen, and participants responded by pressing the corresponding number. Another group of participants completed the same task, except the number (2 or 8) appeared on the screen's left or right side. In study two, participants viewed a series of four similarly valenced words and responded to a number (2 or 8) appearing on the screen's left or right side. These studies reinforced findings of previous research, but indicated no relationship between affect and horizontal positioning.

Teaching to the Masses: General Music in High School

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Mentor - Jamila McWhirter, Music, jmcwhirt@mtsu.edu, 615-898-5922

Research in music education has recently turned to general music on the secondary level. Researchers agree that this is an extremely important time in adolescents' lives and that music education should cater towards their passions and interests in order to expose as many students to as much music as possible. Not all students fit into the traditional band, choir, or orchestra classes. This pilot study seeks to determine if high school music teachers in Rutherford County, Tennessee are including students in music classes other than band, choir, and orchestra. A review of related literature will be used to formulate a survey instrument.

The purposes of this pilot study are to (a) determine the current general music class offerings for high school students in Rutherford County and (b) the number of students currently enrolled in these general music classes. Additional examination will include the evaluation of music teachers' perceptions regarding general music classes.

Data will be reported as percentages and a categorization of all types of general music classes offered in Rutherford County high schools. Results will be discussed. Further studies may examine what types of secondary general music classes are offered elsewhere in the country and how music teachers are implementing the successful programs.

Regioselective Triple Suzuki Couplings of Trihalopyridines

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Substituted pyridines are found in a number of compounds of biological and materials interest. As a result, an efficient synthesis of these compounds would be of great use. One option is to employ cross-coupling reactions. Although versatile, the traditional cross-coupling approaches use a sequence of halogenations then coupling for each substituent to be installed. The Suzuki cross-coupling has been used previously established in the application of convenient one-pot double coupling in the case of dihalogenated heteroaromatics. Regioselective polycouplings offer the attraction of reducing the number of steps required to access multiply substituted compounds. It has been previously applied to convenient, one-pot double couplings. The present research extends the method to triarylated pyridines by one-pot methods. The results of these studies are offered.

Assessing the Comprehensibility of Intensity Cues Frequently Used in Physical Activity Recommendations

Elizabeth Holbrook (graduate student), Health and Human Performance; Tiago Barreira (graduate student), Health and Human Performance; Krystle Emison UT Memphis; Minsoo Kang (faculty), Health and Human Performance

Mentor - Minsoo Kang, Health and Human Performance, mkang@mtsu.edu, 615-904-8426

The purpose of this study was to assess the comprehensibility of intensity cues that are used most frequently in physical activity recommendations. Forty-seven healthy adults (23 females; age = 24 ± 4.4 yrs; BMI = 25.7 ± 4.2 kg•m⁻²) consented to participate in this study. All participants were high school graduates with at least some college education. Participants were instructed to complete several 100-m walking trials at three frequently-referenced intensities of activity, including “slow”, “moderate”, and “very brisk”. Intensity cues were derived from the Compendium of Physical Activities (Ainsworth et al., 2000) to reflect walking speeds at 2.0 mph, 3.0 mph, and 4.0 mph; no further instruction was given in regard to walking speed. In total, six 100-m walking trials were completed in random order (two trials per intensity). Actual walking speed was recorded using the Speedtrap-II timing system (Brower Timing Systems, Draper UT), and was measured as the average of the two trials at each of the intensity cues. One sample t-test was used to determine the degree with which the participants’ chosen walking speeds corresponded to the speeds outlined in the Compendium of Physical Activities. Additionally, intraclass correlation coefficients were calculated to determine walking speed reliability pertaining to each intensity cue. The results illustrated considerable variation in the participants’ perceptions of intensity associated with each pace cue (slow = 1.45 – 3.31 mph; moderate = 2.26 – 4.41 mph; very brisk = 3.14 – 5.88 mph); where average walking speeds corresponding to “slow”, “moderate”, and “very brisk” intensity cues equated to 2.73 mph, 3.29 mph, and 4.13 mph, respectively. The actual walking speeds in response to the “slow”, “moderate”, and “very brisk intensity cues were significantly faster than the intended intensities outlined in the Compendium of Physical Activities, $t(65) = 12.5$, $p < .001$; $t(65) = 5.76$, $p < .001$; $t(66) = 2.08$, $p = .042$, respectively. Intraclass correlation coefficients were acceptable ($> .80$) across intensities (.82, .81, and .88 for speeds corresponding to 2.0 mph, 3.0 mph, and 4.0 mph, respectively), illustrating reliability evidence of walking speed at each of the chosen pace cues. To conclude, large variations in walking speed may have significant implications on the physical activity recommendations currently in place. The finding that individuals perceive these recommended intensities to be significantly higher than intended may influence the degree to which individuals adhere to existing physical activity recommendations.

Influence of an Activity Log on the Success of a Goal-Based Walking Program

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A recent systematic review of pedometer-based physical activity interventions concluded that a significant determinant of a successful intervention include either the implementation of a pedometer-based walking goal or the use of an activity log (Bravata et al., 2007). However, the combined influence of these factors for enhancing ambulatory physical activity remains unknown. Therefore, the purpose of this study was to examine the influence of step-recording in an activity log in conjunction with a goal-based walking program for enhancing daily physical activity. Ninety-four healthy adults (females = 65; age = 21.2 ± 3.5 years; BMI = 26.1 ± 5.1 kg/m²) consented to participate. Baseline physical activity levels were monitored for seven consecutive days using an Omron HJ-151 pedometer. With 22 participants acting as controls (Group 1), the remaining 72 participants were separated into two groups and were given a 10,000 steps/ day walking goal to be achieved over the course of a 10-week pedometer-based intervention. In order to investigate the separate and combined influence of the step goal and activity log on daily physical activity, one group of intervention participants were required to record pedometer-monitored daily step counts in an activity log (Group 2); the final group wore a pedometer throughout the intervention but did not record their daily steps (Group 3). A 3x2 (groups x time) repeated-measures ANOVA with between-subject factor, treatment (Groups 1, 2, and 3), and within-subject factor, time (pre- and post-test), was used to analyze differences in physical activity level. Follow-up simple effects and contrasts were used to determine significant findings, and an alpha level was set at .05, a priori. Results of the ANOVA illustrated a significant interactive effect for groups ($F_{2,91} = 3.77$; $p = .027$), with a significant simple effect at the post test observed between Group 1 and Group 2 ($F_{2,91} = 3.87$; $p = .024$; mean difference = 2,087 steps/day). Post-test mean steps/day for the three groups were as follows: Group 1 = $7,409 \pm 2,882$, Group 2 = $9,496 \pm 4,075$, and Group 3: $7,792 \pm 2,134$. A significant effect for time was also observed ($F_{1,91} = 26.84$; $p < .001$), illustrating increases in steps/day from pre-test to post-test across groups. Collectively, the use of an activity log in conjunction with a walking goal is recommended for enhancing ambulatory physical activity in young adults. The activity log may increase participant accountability en route to achieving the physical activity goal.

Effects of Acute Temperature Change, Confinement and Housing on Plasma Corticosterone in Water Snake

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Body temperature affects many aspects of reptilian behavior and physiology, but its effect on hormonal secretion has been little studied, especially in snakes. Major objectives of this study were to determine if acute changes in body temperature during confinement influenced plasma corticosterone levels and if initial body temperatures upon capture in the field were related to baseline corticosterone levels in water snakes (*Nerodia sipedon*). Water snakes were bled upon capture in the field and after one hour of confinement in a cooled, control, or heated incubator. Since little is known about the potential metabolic changes in response to stress in reptiles, plasma triglyceride levels were also measured. Upon completion of the field study, snakes were housed for 5-8 days without food to determine the effect of chronic stress on both corticosterone and triglyceride levels. Plasma corticosterone concentrations were measured using enzyme-linked immunosorbant assay (ELISA) and plasma triglycerides were determined enzymatically. In the field, experimental alterations of body temperature during confinement had no effect on corticosterone levels. Similarly, there was no correlation between initial body temperature and baseline plasma corticosterone concentrations. However, post-confinement corticosterone levels were approximately three-times greater in females than males. Plasma triglyceride levels were not affected by temperature treatment, confinement, or sex. Compared to field values, both baseline and post-confinement corticosterone levels were elevated after the chronic stress of short-term laboratory housing but triglyceride levels decreased. Overall, these results indicate that sex but not body temperature has a major influence on the adrenocortical stress response in *Nerodia sipedon*.

A Qualitative Study of the Citizen Science Program at the Great Smoky Mountains Institute at Tremont

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The Great Smoky Mountains Institute at Tremont (GSMIT) has supported summer research internships since 2001 in cooperation with ALCOA Company, selected universities, and the All Taxa Biodiversity Inventory. Research interns spend a total of 300 hours each summer conducting various research projects supervised by the Citizen Science Director at GSMIT. The goal of the program is to provide communities with budding leaders in environmental fields and/or responsible, scientifically literate citizens. To determine the impact of this program's objectives, a qualitative narrative interview research design was selected. Qualitative studies are known to be developing and shifting in nature and so was the case for this study. The results from this study will include information on how field science research will longitudinally affect the participants in regard to environmental awareness or attitude and career or college choice. Participant responses to a scenario of a scientific problem will be analyzed about their knowledge of the scientific method. For GSMIT, the results will be used to provide information about how to improve the program for the participants and to provide data to the fundraisers of the program. This data will also be useful nationally to environmental education centers with a similar focus.

Gender and Musical Instrument Choice: A Survey of Beginner Band Directors in Rutherford County

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Mentor - Jamila McWhirter, MTSU School of Music, jmcwhirt@mtsu.edu, 615-898-5922

Interest in the field of gender as it relates to music has grown rapidly over the past few years. Specifically, researchers have sought to determine what factors are involved with beginning band students (4th, 5th, and 6th graders) choosing their respective instruments. Research shows that students tend to choose gender-consistent instruments: female instruments include flute, clarinet, and violin; male instruments include trumpet, low brass, and percussion; and gender-neutral instruments include saxophone and French horn. The purposes of this pilot study are to (a) discover what methods are in place when students first select their instruments, and (b) determine what percentage of students in Rutherford County play gender-consistent instruments. A review of the related literature was used to formulate a survey instrument. Areas of examination include: (a) the methods in place for guiding students in instrument selection; (b) the number of female and male students involved in beginner bands; and (c) the instrument choices according to gender. Data will be reported in percentages. Results will be discussed in relation to prior research. Additional studies may wish to pursue what percentages of gender-consistent instrumentation exist throughout the state of Tennessee, as well as its bordering states.

Short-term and Long-term Effects of Kingston Fossil Coal Ash on Native Freshwater Mussels

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In my proposed study freshwater mussels (*Unionidae*) will be used to demonstrate what impacts the fly ash spill is having on local mussel populations in the Emory River (ER). The ER is adjacent to the TVA Kingston Fossil Plant in Roane County, Tennessee. On December 22nd 2008 the largest release of fly ash occurred when an earthen dike failed to retain a fly ash storage pond on the property, releasing the contents of the pond into the surrounding land. By caging freshwater mussels at three locales on the ER, site 1; spill site, site 2; a moderately impacted location between site 1 and 3, and site 3, a reference site ~9 river miles upstream from the origin of the contamination, I hope to show how the mussels are being impacted by the fly ash release over a continuum.

Collections of mussels from each site will be taken on Day, 7, 14, 21, 28, 42, 56, 84, and 112 at random from the respective cages. Prior to the start of a testing period 20 mussels will be selected at random to establish baseline conditions. The specimens will be analyzed for a variety of physical, chemical, and biological endpoints e.g. mortality, Mussel Health Index, bioaccumulation of heavy metals, glycogen, histopathology, and metallothionein. Along with the mussels being collected a sediment sample will be taken for analysis at Middle Tennessee State University at each site.

The field work will be complimented by a laboratory study investigating the impacts of the Kingston fly ash on freshwater mussels. In a static renewal bioaccumulation toxicity study pristine mussels will be subjected to various concentrations of fly ash to non impacted sediment on a weight to weight basis for up to 112 days to provide a direct comparison between field experiments and controlled laboratory studies.

Human Capital from Different Source Countries and US New Immigrant Earnings

Wei Kang (graduate student), Economics and Finance

Mentor - Joachim Zietz, Economics and Finance, jzietz@mtsu.edu, 615-898 5619

The United State is known as a nation of immigrants. The role of immigrants in the U.S. labor market has long generated substantial interest among researchers and policymakers. Human capital accumulation is a crucial determinant of individuals' earnings. For immigrants, it is important to differentiate between the education and working experiences obtained from different source countries, due to variations in quality as well as different levels of geographic and cultural proximity. Using data from the New Immigrant Survey (NIS), I examine the determinants of U.S. new immigrants' earnings. A framework of analysis is constructed with human capital as the key source of earnings variation and other individual characteristics controlled. I apply the Heckman selection process in estimation in order to control self-selection bias. The results show that education and working experiences obtained in the U.S. are more valued than the human capital obtained abroad in general; however, human capital affect wages earnings of immigrants from different source country differently.

Asymmetric Effects of Oil Price Changes on Income

Wei Kang (graduate student), Economics and Finance

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Oil price changes have significant effects on economy activity. Interest in asymmetric effects of oil price changes arises when people noticed that a sharp increase in oil price in 1979 was followed by an economy downturn but a major decline in oil price in 1986 did not induce a notable economy expansion. Previous studies have established a nonlinear relation between oil price changes and aggregate measures of economy, such as employment, consumption, GDP, etc. Oil price shocks are transmitted into the economy through different mechanisms, and will have a greater impact on energy-sensitive industries, such as automobile. Thus, state-level economies with different industry structures are supposed to be affected differently. In this study, I use the net oil price change approach to examine the effect of oil price changes on state-level income. The results show that the state-level incomes response to energy price shocks differently.

Relationship Between Objectively Measured Physical Activity and Chronic Stress Level

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The purpose of this study was to investigate the relationship between daily steps and chronic stress levels. A total of 94 college students, volunteered to participate in this study; a total of 84 (18 males, 66 females; age = 21.2 ± 3.3 years; BMI = 26.5 ± 5.7 kg/m²) had enough step data (> 4 days) and completed the stress questionnaire. Physical activity was measured for seven consecutive days using an Omron HJ-151 pedometer and chronic stress level was measured using the Perceived Stress Scale -10 (PSS-10). The PSS-10 scale ranges from 0-40 with a higher score meaning a higher stress level. Pearson correlation coefficient was computed to determine the relationship between average daily steps and stress level. In addition, independent t-test was computed to investigate possible differences between inactive (< 7,500 steps per day) and active (> 7,500 steps per day) participants (Tudor-Locke and Bassett, 2004). The average daily steps were $6,536 \pm 2,556$ steps and the average stress level was 16.2 ± 5.5 . The results showed no relationship between average daily steps and stress level, $r = .01$. The average stress level for the inactive group was 15.9 ± 5.8 and the average stress level for the active group was 17.1 ± 4.5 . The independent t-test results showed no significant difference between the stress levels between groups $t(84) = -.86$, $p = .39$. Contrary to the expectations, there was no correlation between directly measured physical activity and stress levels, and the active group showed similar levels of stress to the inactive group. However, this was a fairly inactive group with only 24% of participants classified as active and only 7% of participants were above the usually recommended 10,000 steps per day. Further investigation of the relationship between physical activity intensity and stress level is warranted.

The Relationship of Stress, Social Support, and Park Use on Depression and Blood Pressure Among Older Adults

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Mentor: Dr. Helen M. Binkley. (Health and Human Performance) hbinkley@mtsu.edu

The older adult population in America has tripled and is continuing to grow. Maintaining health is critical to sustain quality of life. This research study addresses the importance of health in older adults by examining the correlation between park usage, stress, and social support on depression and blood pressure. Research includes a sample population of 103 older adults (50 years of age or more). Participants from the Cleveland Metroparks volunteered to complete a seven day diary including perceived stress levels, cortisol levels, blood pressure (systolic and diastolic levels), social support, park use and depression. Three multiple regression equations were used to determine the accuracy in predicting depression, systolic blood pressure and diastolic blood pressure, mutually exclusively. Independent variables used in each of the multiple regression equations included cortisol levels, self assessed stress levels, park usage and social support. Results conclude that the regression model significantly predicted depression, $R^2 = 0.418$, $R^2_{adj} = .363$, $F(8,85) = 7.634$, $p < 0.0001$. The model accounts for 41.8% of variance in depression. The model predicted systolic blood pressure, $R^2 = 0.197$, $R^2_{adj} = .120$, $F(8,84) = 2.569$, $p < 0.015$. The model did not lead to significant results in predicting diastolic blood pressure ($p < 0.071$). Social support and health were significantly contributing to the model, $p > 0.0001$ and $p > 0.005$, respectively. This research study emphasizes the importance of social support and park usage for older adults to maintain health and reduce depression.

The Characterization of Co-pigmentation Products Produced in Red Wine During the Aging Process

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Mentor - Beng Guat Ooi, Chemistry, bgooi@mtsu.edu, 615-898-2076

Red wine contains numerous flavonoid and non-flavonoid compounds. The flavonoid compounds included the anthocyanidins, anthocyanins, flavonols, and flavanols. The non-flavonoids compounds are the hydroxybenzoic acids derivatives, hydroxycinnamic acids derivatives, stilbenes, and the higher aromatic alcohols. These components are responsible for the color, texture, and flavor of the wine. During the aging process, condensation reaction known as co-pigmentation occurs between pigmented flavonoids and non-pigmented flavonoids or nonflavonoids. Adducts of anthocyanins with nonflavonoids can cause changes in color and flavor of the wine. The tint of the wine can undergo a bathochromic shift from violet to brick red or orange as the polymeric condensation products increase in molecular weight and precipitate as wine sediments. Hence, the taste, aroma and texture of the wine will change accordingly. Sediments from the Zinfandel 2002 red wine was analyzed using the high performance liquid chromatograph (HPLC) with diode array detection (DAD). Initial data suggests that the condensates are composed of malvidin, quercetin-3-glucose, quercetin, myricetin, and possibly malvidin-3-glucose. The condensation products that were separated on the HPLC were further analyzed by nuclear magnetic resonance (NMR) spectroscopy. The condensates were also characterized using the thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) by determining the different melting points (T_m) of the species in the polymeric condensates. Further analysis of the components in the wine condensates was carried out using a Curie point pyrolyzer coupled to a gas chromatography-mass spectrometer.

Get Movin'

Patricia Hicks (graduate student), Computer Information Systems; Jamie Lakey (graduate student), Computer Information Systems

Mentor - Melinda Korzaan, Computer Information Systems, mkorzaan@mtsu.edu, 615-898-2373

This project is a website application for a fictitious organization named Get Movin'. Get Movin' is a children's physical activity studio. The mission of the studio is to provide the local community with a place for children to participate in physically active disciplines (e.g. dance classes). The website was developed in ASP.NET 2.0 with C Sharp as the programming language and Microsoft Access as the database. The application is a fully interactive website that enables the studio to keep track of customers, physical activity classes, and class schedules. It also allows customers to enroll in classes and provides an online shopping cart for customers to purchase equipment and accessories. The poster display will include product management documents (e.g. project scope statement, project schedule, ERD diagram, and various screen shots of the web application). In addition, the website will be running on a laptop for an interactive demo of the application.

Common Information Management Systems: Project Risk Assessment

Lindsay Morris (graduate student); Wesley Lankford (graduate student); Mike Yerty (graduate student), Computer Information Systems

Mentor - Melinda Korzaan, Computer Information Systems, mkorzaan@mtsu.edu, 615-898-2373

This project is a comprehensive risk assessment for the Waterloo Regional Police Services' Common Information Management Systems (CIMS) project. In brief, the CIMS project is a computer-based information system that was being developed to provide a common information-sharing platform for seven police organizations in Ontario. The student team was given an assigned case study in which the CIMS project was detailed and based upon the information outlined in the case; the team developed a complete risk management portfolio. The team took on the role of a project risk management consulting group, named Risky Business, and completed the following risk management deliverables: (1) assumptions, (2) a probability scale, risk impact scales on scope, time, cost and quality, (3) a risk breakdown structure, (4) a risk checklist, (5) risk information sheets, (6) project cost estimates incorporating risk events, (7) a risk response log, and (8) lessons learned documentation. The poster display will include key risk management documents and power point slides outlining the CIMS project as well as the risk assessment process.

Toward a Place-Based Theory of Health: A Review of Emerging Research

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Continued research is emerging on the impact of social place on health, but there lacks a clear consensus on a theory behind place-based factors and possible health risks. We review recent studies in these areas to examine the various theoretical approaches developed in the emerging literature. Our review identifies and summarizes a variety of social theories used to explain the association between place and health. We then employ Fitzpatrick and LaGory's (2000) place-based theory of health, which combines elements of urban ecology with theories in medical sociology, and proceed to supplement current theoretical formulations by exploring the intersections of place and health lifestyles in the creation of either positive or negative health outcomes. We conclude with a discussion of methodological considerations in the analysis of place-based health inequalities, and by suggesting new methods to advance and synthesize the various approaches in these areas of sociology.

An Investigation into the Dynamic Effects of Diabetes: A Panel Data Analysis

Travis Minor (graduate student), Economics and Finance

Mentor - Mark Owens, Economics and Finance, mfowens@mtsu.edu, 615-898-5617

This paper examines the dynamic effect of diabetes on the American Labor Force. Previous economics literature examines diabetes as a static disease. However, medical literature states that diabetes must be constantly maintained; otherwise, its severity will grow over time. This paper tests whether diabetes has a single static impact, or if it has an effect that changes or grows over time. Using data from the National Longitudinal Survey of Youth 1979, estimates will show the importance of a dynamically specified diabetes measure. An instrumental variable technique is also employed to control any source of endogeneity bias present in the estimation. Sibling information, specifically sibling's reported diabetes and sibling's body mass index, is used to predict a respondent's own diabetes. These instruments provide a theoretical and statistical significance for the estimation of health variables on labor market outcomes.

Meditation in Academia: The effect of Meditation on Test Anxiety

Nick Burgess (graduate student), Psychology; Thomas Brinthaup (faculty), Psychology

Mentor - Thomas Brinthaup, Psychology, tbrintha@mtsu.edu, 615-898-2317

The present study explores the relationship between meditative practices and test anxiety among college students. Previous research offers some support regarding the use of meditation for general stress relief. However, there is very little research regarding the relationship between meditation use and test anxiety. MTSU students were identified who scored either very high or very low in test anxiety on Spielberger's Test Anxiety Inventory (1980). These students were then recruited to participate in a survey on academic performance and general health practices, including meditation and related activities. Results will be discussed with regard to the use of meditation and other stress reduction practices in alleviating test and other stress reduction practices in alleviating test and other kinds of anxiety.

Laeverin and LTA4H mRNA Splicing in Normal and Cancerous Human Tissues

Carrie Romer (graduate student), Biology; Rebecca Seipelt (faculty), Biology

Mentor - Rebecca Seipelt, Biology, rseipelt@mtsu.edu, 615-904-8393

Multiple proteins may be expressed from a single gene when the gene's pre-mRNA is alternatively spliced. High frequencies of aberrant mRNA splicing have been observed in tumor cells compared to normal cells. Human laeverin and leukotriene A4 hydrolase (LTA4H) genes synthesize aminopeptidase enzymes which are potentially involved in cell signaling and cell cycle regulation, as well as activating or inactivating other proteins. It is possible that alternative splicing might change the protease specificity and/or activity level by modifying the aminopeptidase protein. This, in turn, would affect all downstream targets and therefore disrupt certain cell signaling pathways. The purpose of this study is to determine if splicing is occurring differently in normal and cancerous tissues for the laeverin and LTA4H genes. The five unaffected and five tumor human tissue RNAs in the analysis were prostate, kidney, cervix, colon, and thyroid. Reverse transcriptase-PCR (RT-PCR) was used to amplify the portion of the tissues corresponding to either the laeverin or LTA4H gene. The resulting cDNA copies were subjected to electrophoresis and the ensuing DNA bands compared to the predicted size. These results to date show alternative splicing for these mRNAs occurs in both normal and tumor tissues. However, relative quantities of each might differ. Alternative forms, as well as the effect on the protein will be presented.

Racial Discrimination in a Field Experiment

Adam Hogan (graduate student), Economics and Finance; Steve Howard (faculty), Biology;

John Nunley, Economics and Finance; Owens Mark (faculty), Economics & Finance

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The difficulty of showing empirical evidence of discrimination is a well known problem in the social sciences. Ascribing a difference in treatment between two people to prejudice requires controlling for all other differences between those people, which is typically done through statistical controls. Instead, we perform a field experiment that allows for unprecedented control between treatment groups. We sell identical objects on eBay, where the only difference between the two sales are racially distinct user names. Preliminary results show higher prices are obtained by those sellers with white names (e.g., Dustin) than those with black names (e.g., Tyrone).

Causes of Religious Conversion: Testing Religion-Capital Models

Adam Hogan (graduate student), Economics and Finance

Mentor - Mark Owens, Economics and Finance, mfowens@mtsu.edu

In this presentation I test religious capital models by investigating empirically the causes of religious conversion in a large cross section of American youths. I attempt to avoid the endogeneity bias that is prevalent in previous efforts to estimate religiosity in order to identify causal effects. I find support for rational choice theories of religious behavior and religious capital accumulation. Religious capital is shown to be significant in determining the likelihood of changing religions as well as the likelihood of changing back to the faith in which one was raised. Furthermore, this study shows evidence of bargaining with religious organizations - as shown by the significant and positive effect on the likelihood of conversion when the subject is diagnosed with an incurable disease.

Lead Accumulation and ALAD Activity in Ground Beetles (*Coleoptera: Carabidae*) Found on or Near Dove Hunting Fields

Morgan Cook-Shivers (graduate student), Biology; Frank Bailey (faculty), Biology

Mentor - Frank Bailey, Biology, 615-898-5483, fcbailey@mtsu.edu

Ground beetles (Family *Carabidae*) are extremely common across North America. As predators and scavengers they are at or near the top of their food chain. This high trophic status makes ground beetles ideal for studying trophic transfer and accumulation of contaminants. Previous studies involving metals and Carabids have demonstrated accumulation in beetle tissues and specifically that lead (Pb) from spent shotgun pellets is bioavailable in soil and accumulates in beetles. δ -aminolevulinic acid dehydratase (ALAD) is an enzyme involved in heme production and is recognized as a useful biomarker of Pb exposure in humans and other animals. Biomarkers such as ALAD are important because they provide early warning signs of contaminant effects before other types of toxicity are seen. Little is known about ALAD activity in beetles, and more specifically about ALAD as a biomarker of sublethal Pb exposure. The objective of this study is to examine differences in Pb accumulation and ALAD activities in ground beetles found on two dove hunting fields of different ages at Arnold Air Force Base (TN). Beetles were captured in pitfall traps, Pb was determined by GFAA after HNO₃ digestion and ALAD was determined spectrophotometrically. Mean Pb concentrations (ppm) were: Old field = 0.359, range = 0.01-1.31; New field = 0.158, range = 0.007-0.67. Pb concentrations were higher at the longest-used field (t-test; p= 0.017). Mean ALAD activities ($\mu\text{mol}/\text{min}\cdot\text{g}$) were: Old field = 17.3, range = 6.6-28.1; New field = 14.8, range = 8.9-23.6. ALAD activities were not different between fields (t-test; p=0.629). A dosing study is being conducted to determine the concentrations of Pb in food items necessary to cause a specific response in ALAD activity in the beetles. ALAD is a potentially useful biomarker for Pb exposure on contaminated sites since Carabid beetles are widely distributed and are relatively easy to catch.

Regioselective Suzuki-Miyaura Polycouplings on Quinolines and Quinoline Derivatives

Alexander Piala (graduate student), Chemistry; Scott Handy (faculty), Chemistry

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Quinoline derivatives are known to display a wide range of useful biological activities, and as such are important targets for organic synthesis. The most common synthetic approaches to these structures revolve around a number of condensation reactions, which involve closing the bicyclic ring structure after functionalization of the molecule. While this approach can be very effective, it is limited both in terms of substitution pattern and substituent tolerance. To alleviate these difficulties, we have been exploring a cross-coupling methodology that will allow for greater flexibility than traditional methods. This research includes investigation of regioselective polycouplings of polysubstituted heteroaromatics, as well as a one-pot methodology for the addition of multiple different functional groups. One-pot conditions have the potential to greatly decrease both the time required to perform the reaction as well as the amount of waste solvent generated, making these reactions significantly more efficient. These efforts could greatly increase the viability of these reactions for the generation of biologically interesting quinoline species.

Pollution Filtration Capabilities of Pervious Concrete

Spring Gilson (graduate student), Biology

Mentor - Ryan Otter, Biology, rotter@mtsu.edu, 615-898-2063

As the world progresses forward with new technologies, new problems are faced. There is an ever increasing input of pollution into the environment. The largest pollutant to date is Total Suspended Solids (TSS). Another main concern is the concentration of heavy metals in groundwater. A new form of concrete, pervious concrete, is being implemented to help build more environmentally friendly parking lots, sidewalks, and so forth. Pervious concrete is able to recharge groundwater by allowing rainwater to quickly pass through the concrete. Along with this rainwater, there may also be heavy metals and TSS being transported into the groundwater. The contaminants must pass through the concrete, gravel, and dirt layers before reaching a water source. This research will focus on looking at the retention of pollutants by all three layers. In conjunction with the different layers, several different mixtures of pervious concrete will be tested. An additive of fly ash in different percentages and composition will be used to assess whether there is an increase of pollutant retention in the pervious concrete that may prove beneficial.

Exposure to Injury in Sport: High School Football Surveillance System

Timothy Tolbert (graduate student), Health and Human Performance; Helen Binkley (faculty), Health and Human Performance; Norman Weatherby, Health and Human Performance; Lynn Parsons (faculty), Nursing, Michael Miller (faculty), Western Michigan University, Health, Physical Education, and Recreation

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Background

Twenty years ago infectious diseases were the major cause of mortality and morbidity in the world's adolescent population (Blum & Nelson-MMari, 2004). In this decade, children die worldwide due to unintentional injury more than any other cause (Blum & Nelson-MMari, 2004; Danesco, Miller, & Spicer, 2000; Kaplan & Thacker, 2000). This increase in injury related deaths is also seen in the United States. Recreational and sport related accidents are often reported as the major risk of unintentional injury (Blum & Nelson-MMari, 2004).

Purpose

The purpose of this investigation is to answer the following question: What effect does the amount of time spent practicing or playing games have on the occurrence of injury to varsity high school football athletes?

Methods

The injury surveillance system collected data on 15 varsity high school football injuries during the 2008 football season. The injury surveillance system did not collect data on junior varsity activities, club activities, any in-season individual conditioning or weight-lifting sessions, or most out-of-season or nontraditional season practice, game, or conditioning activities.

Results

The results suggest that, when controlling for all other variables, the school an athlete attends and the week during which a practice occurs influences the possibility of an injury event. The results suggest that, when controlling for all other variables, the school an athlete attends, classification in school of the athlete, and the week during which a competition occurs influences the possibility of an injury event.

Conclusions

During practice, the school an athlete attends and the week during which the practice occurs are shown to influence the occurrence of injury among varsity high school football athletes. During competition, the school an athlete attends, the week during which the competition occurs, and the classification of the athlete are shown to influence the occurrence of injury among varsity high school football athletes.

Perceived Benefits of a 12-Week Fitness Program for 5th and 6th Grade Students

Shannon Morrison (graduate student), Exercise Science; Matt Renfrow (graduate student), Exercise Science;
Jenny Hutchens (graduate student), Exercise Science; Jennifer Caputo (faculty), Exercise Science, Brandy Eveland-Sayers (faculty), Exercise Science

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The purpose was to examine the self-perceived benefits of teachers and 5th and 6th grade students to a 12-week fitness (resistance training circuit) program. Two classes (N = 40) participated in the program in the fall and then served as their own control across the spring semester. The fitness program was designed following age-specific training guidelines of the National Strength and Conditioning Association (2000) and the American College of Sports Medicine (2006). Students used a HOIST youth strength training circuit combined with stations designed to enhance cardiovascular endurance, muscle fitness, and flexibility. The program included two 50 minute sessions during the school day each week. The Self Perception Profile was given to students prior to and at the conclusion of the program and the control semester. Students and classroom teachers reported their perceptions of program benefits and their perceptions of changes in the classroom environment, respectively prior to and following the experimental period. Repeated measures analysis of variance (ANOVA) was run to determine differences in self-perception each semester. Analyses were performed for the overall sample as well as independently for boys and girls. An improvement ($p < .05$) in behavioral conduct was found in females while they participated in the training program as compared to the non-training period (.34 and .07, respectively). A greater increase ($p < .05$) in social acceptance was found in males while they participated in the training program as compared to the non-training period (.61 and .13, respectively). Overall, students reported that feeling stronger, having more energy, better grades, being more focused, losing weight, and having improved concentration. Teachers reported a “visible difference” in the way the children approached physical activity during recess. While the impact appears to differ between males and females, participation in the program led to perceived benefits, irrespective of physical adaptations.

The Effect of a 12-Week Fitness Program on Measures of Health-Related Fitness in 5th and 6th Grade Students

Jenny Hutchens (graduate student); Matthew Renfrow (graduate student); Jennifer Caputo, Health and Human Performance - Exercise Science; Brandi Eveland-Sayers (faculty), Health and Human Performance - Exercise Science; Richard Farley, Health and Human Performance - Exercise Science, Faculty

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The purpose of this study was to determine the effectiveness of a 12-week fitness program including cardiovascular, resistance, and flexibility training on measures of health-related physical fitness. Healthy 5th and 6th grade students participated in the study. Two classes participated in the fitness program (n = 40) and three classes served as controls (n = 59). The 12-week fitness program included two 50 minute sessions per week utilizing Hoist equipment and other fitness stations. Exercise Science faculty and doctoral students designed the program following age-specific guidelines of the American College of Sports Medicine (2006) and the National Strength and Conditioning Association (2000). Baseline measures were assessed on all students prior to the beginning and then again at the conclusion of the 12-week program. Health-related physical fitness measures included blood pressure, muscular fitness (1 repetition max leg and chest press, curl-ups, modified pull-ups), aerobic capacity (20 meter progressive aerobic cardiovascular endurance run [PACER] test), body composition (tricep and calf skinfolds), body mass index (BMI), and flexibility (back saver sit-and-reach). Repeated measures analysis of variance (ANOVA) was run to determine group differences. Analyses were performed for the overall sample and independently for boys and girls. Overall, there were statistically significant ($p < .05$) decreases in calf and tricep skinfold thicknesses and BMI, as well as increases in curl-ups, pull-ups, leg strength, bench press, and PACER laps completed. After the intervention, males in the experimental group demonstrated statistically higher ($p < .05$) flexibility scores as compared to the control group. In conclusion, participation in a 12-week fitness program led to significant improvements in measures of health-related physical fitness among 5th and 6th grade students. Our findings support the development of similar physical activity programs for this population, particularly in light of the increased incidence of childhood obesity.

Cloning, Expression, and Purification of Human Matrix Metalloproteinase-14 (MMP-14)

Prashant Singh (graduate student), MSPS Biotechnology; Saffet Guleryuz (graduate student), MSPS Biotechnology; Michael Thompson (faculty), Biology; Rebecca Seipelt (faculty), Honors College, Biology

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Matrix metalloproteases are degradative enzymes implicated in many human diseases, such as cancer, inflammatory disorders, and heart disease. These proteases degrade extracellular matrix proteins which permit remodeling of the tissue to occur normally. However, if these proteases become mis-regulated, they can lead to disease or disease progression, such as cancer metastasis. Therefore, it is critical to understand how they are controlled. This project focuses on the control of a complex of proteins: matrix metalloproteinase-2 (MMP-2), tissue inhibitor of metalloproteases-2 (TIMP-2), and matrix metalloproteinase -14 (MMP-14). Previous data suggested that another protein lactoferrin (LTF) may interact with MMP-2, disturbing the MMP-2 – TIMP-2 – MMP-14 ternary complex and releasing activated MMP-2. To test this hypothesis, the human MMP-14 cDNA was cloned into a protein expression vector for use in protein production. Cloning and expression data in two protein expression systems will be presented.

Equity Sensitivity: A Terror Management Theory Perspective

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This experiment applies Terror Management Theory to the construct of Equity Sensitivity. Past research shows that contemplating one's own mortality prompts outsider hostility and world-view defense. Equity Sensitivity is a preference to over- versus under-reward conditions within supposedly equitable relationships. As a relatively stable trait, Equity Sensitivity may react similar to worldview defense in regards to outsiders. Following a Terror Management approach, participants were primed for mortality saliency and coworker social comparison, and then their equity sensitivity measured as a form of worldview defense. Results generally supported the hypothesis. Equity sensitivity was influenced by an interaction between social comparison and mortality saliency. There was also a significant gender interaction.

Mechanism of Cell Death in Neuroblastoma Cells Exposed to UV-light

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Apoptosis is a highly regulated cellular event characterized by initiation of multiple pathways that result in cell death via ordered disassembly of cell structures. It is an active regulatory mechanism involved in normal physiological events including embryonic development, growth and differentiation, and maintenance of adult mammalian tissues. Altered or loss of apoptotic response contributes to a sundry of pathological conditions, including cancer. To better understand the role of apoptosis in cancer biology we are studying the response of a neuroblastoma cell line (murine Neuro-2a) to UV light, an apoptosis-inducing stimulus. We have found that Neuro-2a cells do not exhibit the classic hallmarks of apoptosis: chromatin condensation, DNA fragmentation, and cytoplasmic blebbing when treated with UV-light. However, control treatments with staurosporin confirm that Neuro-2a cells possess the molecular machinery required for inducing apoptosis. Further, these cells exhibit a death rate comparable to the control, CHO-K1 cell line, which undergo apoptosis when exposed to UV light. These results suggest that UV-light does not activate the classic apoptotic cascades in neuroblastoma cells. Rather, it appears that cell death occurs via an alternative apoptotic pathway or via a non-apoptotic, necrotic pathway.

Sexual Risk Behavior among Adolescent in Ghana, Africa

Kari Campbell (graduate student), Health and Human Performance; Norman Weatherby (faculty), Health and Human Performance
Andrew Owusu, Health and Human Performance; Gloria Hamilton (faculty), Psychology

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Sixty-three percent (63%) of youth living with HIV/AIDS live in sub-Saharan Africa. Yet, there is a lack of data on sexual behaviors among sub-Saharan African youth. This research study seeks to address a segment of the population of Ghana that has not been addressed prior to this research study. The purpose of this study is to examine adolescent sexual behaviors in Ghana, West-Africa using the Theory of Planned Behavior. Data was collected from 11 Senior Secondary Schools in Ghana, Africa. 63% of the sample was from Greater Accra, while 37% was from the Volta region (N = 902). The data was weighted to represent the gender of the population based on the two regions sampled in the study. The sample consisted of 510 boys (56.6%) and 391 girls (43.4%). Age ranged from 16 to 19 years, with 33.2% being 17 years of age. Girls were less likely to intend to use condoms than boys ($\chi^2 = 18.3$, $df = 2$, $p < .001$). In the logistic regression analysis, the model was able to explain 45.9% of the variation in Intention to Use Condoms by the variables in the model ($R^2 = 0.459$). Participants with positive attitudes toward condom use were more likely to intend to use condoms in the next three months. Participants who thought the most important people around them would approve of their condom use were more likely to intend to use condoms in the next three months. The perceived behavioral control variable provided inconclusive results as a predictor of participants' intention to use condoms. Overall, this model is an effective model for predicting adolescents' intention to use condom among Ghanaian adolescent boys and girls.

Storm Chasers: The Energy, Earth, and Civilization Project and the Gathering Storm

Leigh Gostowski (graduate student), Biology; Kim Sadler (faculty), Biology; Linda Gilbert (faculty), Educational Leadership

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Middle Tennessee State University has partnered with middle school students from five schools in Rutherford and Cannon counties to advance science, technology, engineering and mathematics (STEM) education through informal learning experiences. The goal of the NSF-funded Club Neutron is to improve student content knowledge and application, attitudes and beliefs, and engagement in science and mathematics in ways that encourage pursuit of a career in a STEM discipline. Participating schools were selected for this project on the basis of increasing populations of at-risk students and comprehensive assessment scores below the predicted range of growth in science and mathematics. Students attend after-school Club Neutron twice a week, and a two-week Academy for Young Scientists summer camp. Student entrance and exit surveys include questions designed to elucidate student interest level in STEM, in addition to their perceptions of the most important aspect of scientific endeavors at school and in a professional capacity. Preliminary analysis focusing on questions relating to general interest in STEM suggest that student interest increases after participation in the program.

Momentum Strategies: Evidence from the Indian Stock Market

Shah Saeed Chowdhury (graduate student), Economics and Finance; Franklin Michello (faculty), Economics and Finance

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This study investigates the presence of momentum profits on the Indian stock market over the period 1991-2006. Our results show that there are no observed momentum profits or return reversals on the Indian stock market when simple non-overlapping medium-term and long-term strategies and tracking periods are considered. However, when firms are sorted by market value and turnover, we find significant momentum profits in higher market value and higher turnover portfolios for 6-6 (6-month formation and 6-month holding period) strategies. For 3-3 strategies, we find return reversals of winner-loser portfolios when small and low trading volume firms are sorted by market value and turnover criteria, respectively. Interestingly, we also find return reversals for 1-1 short-term strategy for all winner-loser portfolio combinations. That is, last month's winner (loser) portfolio consistently becomes loser (winner) portfolio in the following month. Thus an investor could easily devise an investment strategy that would result in abnormal profit by changing the portfolio every month and holding it for one month.

Research for the Design and Development of Halogen Free Flame Resistant Systems in Engineering Resins

Phillip Mnrirajd (graduate student), Chemistry; Dwight Patterson (faculty), Chemistry; Tom Hooper, Polymer Technology and Services, LLC

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Synthetic polymers are widely used in various applications such as automotives, medical, construction, packaging, and electronics. However, many polymers are flammable under ideal conditions of heat and oxygen and will burn readily to produce smoke and toxic gases. Stricter legislation and safety standards have been developed to protect the consumer, such as the European mandated Restriction of Hazardous Substances and Waste Electrical and Electronic Equipment Directives. Therefore, extensive research has been done in areas of flame retardants (FR) for polymer systems to provide environmentally safe products. This research project is to investigate potential new non-halogenated flame retardants for use in Polycarbonate (PC). The three salt based FR agents used (Sloss KSS, 3M FR-2025 and Bayer C4) are made in to a PC concentrate by spraying the solution of water onto the PC powder. Because the liquid polyphosphate ester FR agent used (Ncendx P-30) was liquid, porous silica was added to and mixed to create a free flowing powder that can be blended with the PC powder. 12 different formulations were tabulated with varying degrees of FR agents and additives. The compounding took place in a manufacturing facility in Evansville, IN where the product was tested under the UL-94 flame test guidelines. Future works will include investigating more FR agents for other polymer systems such as polycarbonate blends and polybutylene terephthalate.

Raman Analysis of Melamine and Cyanuric Acid in Contaminated Pet Food and Milk Products

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Melamine and cyanuric acid were found in contaminated pet food which was linked to the death of many cats and dogs in the U. S. in 2007. Later in 2008, these contaminants were found in milk powder in China and were blamed for the death of babies who consumed the tainted baby formula. Therefore, techniques based on the liquid chromatography-mass spectrometry and gas chromatography-mass spectrometry have recently been developed for screening contaminated food. The goal of this project is to develop an alternative method based on Raman spectroscopy for detecting these contaminants.

A simple and rapid method for preparing stable silver colloids for surface-enhanced Raman scattering (SERS) analysis of melamine and cyanuric acid was developed. The silver nanoparticles were produced by the reduction of silver nitrate solutions with hydroxylamine hydrochloride at alkaline pH and at room temperature. SERS spectra of melamine, cyanuric acid, and melamine-cyanuric complex are significantly different from their respective Raman spectra in terms of changes in the intensities, positions, and shapes of spectral peaks. Based on the SERS spectra of melamine and cyanuric acid at 10 ppm and 100 ppm, enhancement factors of 1.62×10^5 and 1.18×10^4 are obtained respectively. The signal intensity of melamine and cyanuric acid increases as a function of time elapsed after mixing the silver colloid and analytes. This indicates that the adsorption kinetics of both compounds is important in determining the SERS signal intensities. Melamine and cyanuric acid were spiked into wheat gluten and rice protein concentrate in order to simulate the sample matrix of pet food products. The detection of spiked melamine in these food matrices was possible by using the solid phase extraction cartridges for extracting and preconcentrating the target compounds prior to SERS analysis. The detection of melamine contamination in the milk was more readily accomplished than the corresponding detection in the complex matrices of pet food. It was found that the Raman signal in fat-free milk was stronger than that in whole milk. The preliminary results indicate that Raman spectroscopy is potentially useful for detecting pet food contamination.

Analysis of Antibiotics by Surface-Enhanced Raman Scattering and Infrared Analysis

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Raman spectroscopy has applications in a wide spectrum of areas including forensic, environmental, chemical, and pharmaceutical industries. However, Raman signals are usually weak and hence the analysis of active pharmaceutical ingredients (APIs) or impurities in pharmaceutical formulations may be challenging. Therefore, surface-enhanced Raman scattering (SERS) techniques based on gold or silver colloids have been used to enhance the Raman signal to improve the analysis of analytes at low levels. The goal of this project is to use SERS as an off-line detection tool for analyzing antibiotics separated by liquid chromatography. Colloidal silver is prepared by reducing silver salts with hydroxylamine chloride. Substrates based on the coating of colloidal silver nanoparticles on plastic cover slips and copper foils were used to enhance the Raman signals of antibiotics including carbenicillin, kanamycin, ampicillin, Penicillin G, and 6 amino penicillanic acid. Spectral characteristics and detection limits of the antibiotics were compared for the different substrate preparation methods. The same substrates used in analyzing SERS were also analyzed by surface-enhanced infrared spectroscopy (SEIR). The SERS and SEIR spectra have distinguishing features that allow unequivocal identification of the compounds analyzed. The development of a substrate amenable for SERS and SEIR analysis offers a potentially attractive technique for analyzing APIs in pharmaceutical formulations. This approach may be applicable for routine quality control, counterfeit detection, and drug metabolism studies in pharmaceutical industry.

Some New Results of Wavelet Applications in Proteomics

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With the accomplishment of gene sequencing, an important research area in systematic biology, proteomics, has come into being so as to pioneer a prosperous application future in cancer prevention, preparation of new drugs and etc. The development of mass spectrometry (MS) such as MALDI-TOF MS, SELDI-TOF MS, Imaging MS, greatly speeds up the proteomics research. However, the complexity and high dimension characteristic of the MS data pose great challenge for data processing. The MS data may contain contributions from a variety of sources. Thus representation of the measurements in terms of basis function in a single scale will not permit efficient feature extraction or noise removal from a typical process MS data. Multi-scale analysis techniques promise a principle approach for representing and analyzing these complicated biological signals. Wavelets possess multi-scale character and are able to adjust their scale to the nature of the signal features. In this presentation, we'd like to report some recent improvements on the MS based proteomic data processing algorithms, especially in the denoising and peak selection steps by using wavelets. Two adaptive wavelet algorithms based on SURE (Stein Unbiased Risk Estimation) and based on GCV (Generalized Cross Validation) are proposed, respectively. Analysis results from real data sets collect from Vanderbilt Ingram Cancer Center show that these algorithms perform better in denoising in comparing with CROMWELL, an algorithm developed by M.D. Anderson Cancer Center of the University of Texas in 2005. For peak selection part, we applied wavelet modulus maximum method and also the improved difference method to give consideration of both peak intensity and signal to noise ratio of the MS data. A software package is developed based on Matlab. Functions include data loading, denoising, baseline correction, normalization and peak detection. These algorithms are proved to be reasonable, both theoretically and experimentally.

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Predicting Coping Styles as Function of Internal Sources of Acute Stress in Sport among Skilled Male Saudi Arabia College Athletes.

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The purpose of this study was to examine the linear relationship between perceived intensity (PS), perceived controllability (PC), and coping style (CS) in response to acute stress experienced during sport competition among 370 male college athletes ($Age = 21.2$) from Saudi Arabia. The *Sport Stress-Appraisal-Coping Style Survey* (SSACSS) was constructed and validated for this study. The results revealed a negative correlation between PS and PC for internal sources of stress ($b = -.022, p = .499$). The relationship between PC and CS was significant ($b = .208, p = .001$). There was also a significant relationship between PS and CS when controlling for PC ($b = .391, p < .001$). This may reflect the athlete's tendency to remain in control of stressful situations experienced during the contest. Overall, PS and PC significantly predicted CS ($b = .386, p < .001$). Finally, athletes tended to reveal an "approach coping style" than "avoidance coping style" when confronted with a stressor that allowed for more personal control. Further implications of these results suggested that predicting an athlete's coping style is a function of the relationship between the intensity of the stressor and the athlete's perceived control of the stressful event. Additional research is needed to examine the extent to which characteristics of the stressful event predicts the athlete's perceived control and coping style following that event, particularly among Saudi Arabian athletes.

Synthesis and Characterization of Acidic Mesoporous Carbon Acid Catalyst for Biodiesel Production

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The commercial production of biodiesel is typically based on the reaction of triglycerides from seed oils with methanol to form fatty acid methyl esters in the presence of sodium hydroxide. This method of production is not environmentally friendly because it requires a large volume of water to wash the biodiesel product and the neutralization of the alkaline waste. Although solid-supported catalysts based on basic metal oxides have been used to overcome these problems, there is still a need for a solid-supported acidic catalyst because the higher free fatty content of the less expensive feedstocks like used cooking oil or tall oil are not converted to biodiesel esters with high yields. In this study, acidic mesoporous carbon catalysts for biodiesel production was synthesized by reacting Pluronic F127, phloroglucinol and formaldehyde under controlled conditions followed by thermal treatment at 840 °C and further reaction with fuming sulfuric acid to yield the functionalized the mesoporous carbon. The mesoporous carbon catalysts were characterized using XRD, SEM, TGA, and BET analysis of surface area. Results suggest the presence of mesopores and sulfonic acid groups. This study shows that the sulfonated mesoporous carbon catalyst prepared from phloroglucinol and Pluronic F127 yielded an acidic catalyst with a high surface area and a narrow pore size distribution at about 5.9 nm. It was noted that the hydrogen bonding between phloroglucinol and Pluronic F127 contributed to ease of self-assembly and consequently the highly ordered mesoporous carbon product. The highly acidic reaction conditions also promoted the polymerization rate of phenolic resins and induce Coulombic interactions in the self-assembly of the surfactant-polymer nanocomposites that were critical in yielding the mesoporous carbon structure. Preliminary evaluation of the MPC-127 catalyst for transesterification shows that the catalyst was capable of yielding biodiesel esters but the reaction was not complete.

Studies of the Adsorption of Aminobiphenyl Isomers on Silver Nanoparticles

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Aromatic amines such as aminobiphenyl (ABP) isomers have been studied by various research groups as putative bladder carcinogens. Among the three isomers, 4-ABP and 3-ABP are reported as human carcinogens and the carcinogenicity of 4-ABP has been shown to be greater than that of 3-ABP. The current methods of detection for ABP isomers and their metabolites include high performance liquid chromatography, liquid chromatography/mass spectrometry, gas chromatography/mass spectrometry (GC/MS), and electrochemical techniques.

Raman spectroscopy is capable of detecting ABP isomers at very low concentrations via surface-enhanced Raman scattering (SERS), in which the Raman signal is enhanced by the presence of silver nanoparticles that allow the adsorption of analytes. The shape and size of the silver nanoparticles play an important role in influencing the magnitude of the signal enhancement. Silver colloidal particles prepared under different centrifugation conditions have been characterized by transmission electron microscopy in order to correlate the physical characteristics of particles with the degree of Raman signal enhancement. The spectral differences of the Raman spectra of the neat ABP isomers versus their SERS spectra will be described with regard to the changes in the intensities, positions, and shapes of the peaks.

Raman signal enhancement is highly dependent on the rate of 4-ABP adsorption onto the silver nanoparticles. The SERS signal was found to increase from the time of mixing the colloid and 4-ABP up to 4 hours followed by a gradual decrease over a 24-hour period. The adsorption kinetics is further studied by solid phase micro extraction in conjunction with GC/MS to provide a better understanding of the adsorption process among the three ABP isomers in order to develop an optimal method for their analysis.