VCU Poster Symposium For Undergraduate Research and Creativity

Wednesday April 22, 2015
Student Commons 2nd Floor
11am—2pm Keynote at 12pm

Part of VCU Student Research Weeks 2015!

Questions?
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All Abstracts Organized by Poster Number

1. The Fall Of Teotihuacan

Elizabeth Ale, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

In this project I plan on presenting a survey of multiple theories regarding the dissolution of the ancient Mesoamerican city of Teotihuacan. This complex city-state was established around 100 BCE and became one of the largest and most powerful sites in Mesoamerica. Located about 25 miles northeast of what is today known as Mexico City, Teotihuacan was home to many advanced technological and social structures, including a pyramid called The Pyramid of the Sun that boasted a base as large as the Great Pyramid of Giza's. At some time between the 7th and 8th century CE, Teotihuacan went into decline. In this project I will showcase a few of the theories regarding the cause of this decline and then conclude with my own observations.

2. Sildenafil citrate (Viagra ®) prevents ethanol induced injury in H9C2 cardiomyoblasts cells treated with high glucose

Salma Omer, Dept. of Chemistry, Center on Health Disparities IMSD Research Trainee with Arun Samidurai and Dr. Rakesh Kukreja, Pauley Heart Center, VCU

Type II diabetes is a major risk factor for heart attack, which is characterized by high blood glucose level and insulin resistance. Cardiomyocyte cell death is a major contributing factor for diabetic cardiomyopathy. Alcohol by itself is a major cause for cardiac dysfunction, which decreases cardiac contractility in both animals and man. Although there are various studies done on the individual effects of diabetes and alcohol in heart, the additive toxic effect of alcohol in the diabetic heart has never been investigated before. Therefore we designed this investigation to understand the deleterious effects of ethanol in H9C2 cells, a rat cardio myoblast cell line. We hypothesize that ethanol will induce cell death by activating apoptotic signaling pathways and also by increasing reactive oxygen species (ROS). Since PDE 5 inhibitor, Sildenafil citrate (Viagra) has powerful cardioprotective effect, we further hypothesized that this drug will have beneficial effects in protection of H9C2 cells treated with ethanol under hyperglycemic conditions. H9c2 cells were grown under standard conditions with 5mm glucose (Normal) and 33mM (High glucose) with or without ethanol at 50mm and 100mM concentration for 24 hrs. A subset of cells were also treated with sildenafil (μM) to see prevent the ethanol induced injury. Flow cytometry analysis was used to quantify cell necrosis and apoptosis. Ethanol at 50 mM and 100 mM induced 27 % and 41 % cell death respectively both at low glucose and at high glucose treated cells (Table 1). Western blot was performed to analyze the expression of p- AKT, Bcl-2 (pro-survival) and (Bax) pro-apoptotic proteins. The results showed that Bax increased in cells incubated with ethanol alone; and but decreased with sildenafil, and sildenafil + ethanol incubated cells. Surprisingly phospho-Akt was increased both in ethanol and ethanol plus sildenafil group. The increase in P-AKT could be an adaptive process. Bcl-2 an anti-apoptotic protein also increased with ethanol treatment and was down regulated by sildenafil treatment.

Table 1.

Ethanol	Normal Glucose (5 mM)	High Glucose (33mM)	High Glucose + Sildenafil
50 mM	27%	28%	18%
100 mM	41%	41%	28.8%

Salma Omer's home institution is Virginia Commonwealth University.

3. Community violence exposure and callous-unemotional traits in adolescents: Testing parental support as a promotive versus protective factor

Tess Davis, Chrissy Ammons, and Alex Dahl, Dept. of Psychology, with Dr. Wendy Kliewer, Department of Psychology

Although callous–unemotional (CU) traits are associated with maladjustment in youth, literature predict- ing CU using prospective designs is rare. In the present study we examine associations between exposure to community violence, supportive relationships with caregivers, and CU in a sample of 236 low-income youth (M age = 13.00 years, SD = 1.56 years; 43% male; 92% African American) participating in a 3-wave longitudinal study of violence exposure and adjustment. Both promotive and protective models of linkages between exposure to community violence, support, and CU were investigated. Given known sex differences in CU, sex was explored as a moderator. Regression analysis revealed that witnessing and hearing about community violence, aggregated over 2 waves, were positively associated with CU at the final study wave. Supportive relationships with caregivers, aggregated over 2 waves, were negatively associated with CU but did not interact with violence exposure, suggesting that supportive relationships with caregivers has a promotive but not a protective association with CU in the context of exposure to violence. The pattern of associations did not vary by sex. This study informs our under- standing of factors that contribute to the development of CU.

4. Developing a Neuroplasticity-Based Treatment Program for Psychopathy: Treatment Foci and Options

Mariah Villianueva, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Psychopathy is a neurodevelopmental disorder that is commonly misunderstood as the condition of criminals, and many people believe the best cure is simple confinement for those who ignore society's laws. Psychopathy, though, is a genuine condition with a genetic basis that manifests itself through neurotransmitter system disruption and hormone imbalances. Psychopathy has a serious neurological impact on an individual, with impairments largely focused in the prefrontal cortex and amygdala, as well as overall negatively affecting the limbic system of the brain. Together, the total impact causes issues with that individual's ability to empathize, to experience emotions normally, to develop a true sense of morality, and other

similar consequences to one's moral and emotional self. Considering the effects of psychopathy, it does not benefit society to undermine its validity as a genuine neurological condition or to simply define it as untreatable. Confinement and traditional treatment options do not prove substantial choices for working with the core problems of psychopathy, either, as prior cases with psychopathic criminals show. For these reasons, a review of research of psychopathy as a condition and of the use of neuroplasticity in treatment shows neuroplasticity as an increasingly valid treatment option that could be applicable to psychopathy. Neuroplasticity, specifically cognitive rehabilitation, non-invasive and deep brain stimulation, and neuropharmacology, has been proven to successfully treat an array of neurological diseases and disorders. Developing a comprehensive treatment program based on neuroplasticity could prove the most effective option for treating psychopathy, and would also have further applications as a modified plan to help treat psychopathic tendencies in children before the condition becomes full-blown psychopathy.

5. C. cassia: The effective use of C. cassia as an economical and safe treatment for type 2 diabetes.

Pascaline Ezouah, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

In 2012, type 2 diabetics accounted for 90-95 percent of the 29.1 million Americans that were diagnosed with diabetes. Although there are various treatments for diabetes, these cures can be costly and are also known to have adverse side effects including increasing the risk of cancer and cardiovascular disease. With an annual cost of $245 billion, it is important to analyze the use of C. cassia, commonly known as cinnamon, as a cost saving alternative for type 2 diabetes treatment. This analysis of literature sets out to determine if C. cassia can be an effective cure and preventative method for type 2 diabetes by conducting systematic research on the chemical properties of C. cassia, the burden of diabetes in the United States, the use of cinnamon in type 2 diabetics and the side effects of common diabetic treatments. According to various literature on the current research that has been conducted, it appears that cinnamon may be a useful treatment and economical and safe treatment for diabetes. However, in order for C. cassia to be implemented into patient care, more research should be conducted to determine the possible side effects of this treatment, the optimal species, the optimal dosage, patience tolerance over time and possible drug interactions.

6. The Relationship between Stressful Life Events and Risky Sexual Behavior

Hassan Khuram, Dept. of Psychology, with Dr. Danielle Dick, Ashlee Moore, and Dr. Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

This study seeks to examine the relationship between stressful life events and risky sexual behavior in Spit for Science: the VCU Student Survey. Research has shown that when facing a stressful life event, an individual can experience negative and lasting consequences long after the event is over. All subjects used in this study were VCU juniors who entered VCU in the fall of 2011 (n=970). Participants were asked about exposure to different types of traumatic life events (natural disaster, transportation accident or assault). Stressful life events were also

measured by creating a sum score based on the total number of stressful life events a person experienced. Risky sexual behavior was measured with a sum score of up to 5 possible different types of risky sexual behavior a person could engage in (e.g., unprotected sex in the last 3 months). Linear regressions were used to test the effect of stressful life events on risky sexual behavior. Results showed that there was a significant relationship between stressful life events and risky sexual behavior: the average risky sexual behavior sum score was higher in those participants who had experienced stressful life event. The possibility of a dose-response relationship also exists wherein more stressful life events could result in more risky sexual behavior. These results suggest that those who have faced significant stressful life events may benefit from sex education training.

7. Factors Involved in the Successful Transition to and Subsequent use of an Electronic Health Records System by Individual and Group-Practice Physicians

Naveen Chandra Kotha, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

The use of Electronic Health Records (EHRs) by healthcare professionals has been recommended as a way of improving healthcare quality, patient safety, and workflow efficiency, and lowering costs in the long run. While large hospital systems integrate EHRs into their services, individual and group practice-owning physicians, especially those of specialties and subspecialties, are often left wondering whether they should follow the trend and whether the transition from traditional, paper-chart systems or older EHRs to newer, commercial ones will truly benefit their patients and their practice as a whole. These physicians also often wonder whether benefits such as electronic-prescribing, clinical decision support, and patient results tracking outweigh obstacles such as initial costs, reliability, and user adaptability. This investigation sought to provide a more informed perspective in considering the decision to either transition to an Electronic Health Records system or maintain a traditional paper-chart style system. A number of studies examining care quality improvement and physician satisfaction in regards to transitions to EHRs under various conditions, such as specialty type, previous EHR-experience, and difficulty of transition, among others, were investigated to form this perspective. The improvement of care quality and physician satisfaction as a result of adopting EHRs relies heavily on both the efficiency and completeness of the transition and the EHR's degree of customization towards a practice's specific needs. Since EHRs are continuously being developed and improved, the transition to an EHR system and its subsequent use can be successful with proper preparation for the transition, extended clinician training, and choosing one that is well-tailored to the needs of the specialty and its patients' medical conditions.

8. Forensic Characterization of Bacillus ACT Spores Using Extracellular Fatty Acid Profiles

Cooley, AM, UROP Summer Research Fellow, with B.S., Spain, T. B.S., Stanciu, CE, B.S., Ehrhardt, CJ, PhD., VCU Department of Forensic Science

The goal of this study was to investigate extracellular fatty acid profiles as a forensic signature for the characterization of *Bacillus* spores. Fatty acids found on the surface of spores can provide valuable taxonomic information and can be used to reverse-engineer culturing conditions such as growth medium. Current methods involve complete lysis of the cells in order to extract fatty acids. This can lead to total consumption of an evidence sample, which prevents further analysis (*e.g.*, genetic analysis). However, an alternative method, using acetone to extract fatty acids from the surface of the spore and Fatty Acid Methyl Ester (FAME) extraction reagents allow both extracellular and intracellular fatty acids to be analyzed without destruction to the spore. To test this method, six strains of *Bacillus* organisms *(Bacillus cereus* T-strain, *Bacillus cereus* 14579, *Bacillus anthracis* 690, *Bacillus anthracis* 0517, *Bacillus thuringiensis* HD1 and *Bacillus thuringiensis* HD522) were cultured in three distinct growth media (peptone, tryptone and yeast extract). After extraction, fatty acids are derivatized into fatty acid methyl esters (FAMEs) and then analyzed using a Gas Chromatographer-Flame Ionization Detector (GC-FID).

Results showed that fatty acid profiles could be used to identify the species/strain of the organism as well as growth media. The yeast-extract medium yielded a higher relative abundance of branched-even fatty acids while tryptone-supplemented medium exhibited a higher relative abundance of branched-odd fatty acids. Five fatty acids, 17:0, 15:0 iso, 17:0 *anteiso*, 14:0 *iso* and 17:1 *ω5c*, contributed to the majority of the distinction between species and strains. With the use of discriminate function analysis (DFA), clear separation of the three different growth media within a single strain. This method shows that extracellular lipid profiles are a viable forensic signature system for differentiating species/strains of *Bacillus* spore and growth medium used for cultivation. These phenotypic signatures may aid in biocrime forensic investigations to determine identity and the source of an unknown biothreat agent. In addition, this method provides a non-destructive way to analyze these agents while still allowing for downstream analysis.

bacillus, spore, GC-FID

9. The Complex Relationship between Native Americans and the Hipster Subculture: Cultural Appropriation of the Plains Native American Headdress in the 21st Century by Middle-to-Upper Class American Non-Indians of the Hipster Subculture

Marisa Wood, Dept. of International Studies, with Prof. Mary Boyes, VCU Honors College

My research addresses the cultural appropriation of the Plains' Native American headdress by middle to upper class American non-Indians belonging to the *hipster subculture*. The *hipster subculture* appropriates minority cultures while also receiving the benefits of the majority culture to which they belong. The *hipster subculture* is influenced by a generally limited knowledge of Native American culture and the trends pressed by corporations. Native Americans also contribute to stereotype continuation in order to make money. I reviewed six journal articles addressing culture appropriation in fashion, spirituality and stereotypes as well as six journal articles addressing the relationship between identity and appropriation; three journal articles addressing the *hipster subculture* and their reputation for appropriation, and three addressing the Native American's place in the market. Because hipsters notably lack pride in their own culture, the subculture selectively appropriates pieces of Native American culture. With these conclusions, the *hipster subculture* will gain consciousness of their actions and take more caution in their appropriation habits.

10. The Force of *Star Wars*: How George Lucas Made Blockbusters the Droids We're Looking For

Nicholas Atanasio, School of Arts, with Prof. Mary Boyes, VCU Honors College

Coming out of "Renaissance Hollywood," a period of artful inventive films, the "New Hollywood" created by *Star Wars* was vastly different from the film periods that came before it. Using an almost childlike return to stories of myths, the German *bildungsroman*, black and white morals, and superhero-like caped heroes and villains, *Star Wars* brought to audiences a new kind of story that film had yet to see—one that was welcomed in the periods of civil unrest and hyperrealism in film of the 1960s and 1970s. In keeping with this nostalgic return to fantasy, *Star Wars* created a new visual aesthetic, echoing the fantastic actions and exaggeration of comic books. The new aesthetic generated by *Star Wars* centered around high special effects, something previously unseen in Hollywood, to create entire artificial sequences and worlds for its stories. This invention proved so influential that it provided a creative base dictating the aesthetic "feel" of almost every film since 1977. *Star Wars* also created new digital and sound technologies necessary to its story that proved instrumental to the development of the modern Blockbuster. I argue that, bundled together, all of these innovations were the perfect recipe to create something Hollywood was lacking: a high concept, technologically innovative myth machine that has inspired years of change in Hollywood and has transformed the way the industry is structured, affecting every single Hollywood film in the years since.

11. Cultural Factors Associated with Utilization of Antenatal Care Services in Rural India: a Study of Predisposing Characteristics, Enabling Variables, and Perceived Need of Care

Anjali Om, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College

Despite vast economic growth in developing countries in the past few years, infant mortality continues to plague underdeveloped regions, particularly rural regions of India. Many of these deaths are caused by a lack of education and motivation in regard to utilization of antenatal and neonatal care services to prevent and treat consequences of unhygienic umbilical cord care. For years, high incidences of neonatal tetanus have plagued rural areas of India as a result of cultural practices that encourage topical applications of cow dung to cut umbilical stumps either directly or by using ghee heated with cow dung to warm umbilical dressings. In order to increase public awareness of the practical ineffectiveness of tetanus toxoid vaccinations in treating the consequences of unhygienic umbilical cord care, cultural aspects that contribute to mothers' utilization of antenatal care services in rural India should be identified in order to understand sociological factors that affect neonatal mortality rates in rural India so that intervention efforts may be targeted appropriately to effectively eradicate neonatal tetanus. A variety of sociology and public health articles and journals that outline factors deeply engrained in Indian culture that inhibit mothers from accessing health care services hypothesize why legislations that promote availability of vaccines have proved rather ineffective in reducing mortality rates were reviewed. These sources generally attribute lack of utilization of health care services to predisposing variables (such as age, ethnicity, caste, education level, and occupation), enabling variations (distance to health facility, means of transport), and a lack of perceived need of care. An analysis of the reasons behind hesitation and reluctance to use antenatal and neonatal care services can help target intervention efforts to appropriately reach at-risk demographic groups. While immunization is understood as

effective in treating the immediate effects of unhygienic umbilical cord care, education of young, uneducated and unemployed, lower caste, Hindu women before they get pregnant can encourage use of available health care resources. It is only by understanding embedded cultural factors that policies can be constructed to effectively reduce maternal and neonatal mortality rates in rural India.

12. Patterns of the Feedback Environment: Links with Employee Outcomes

Rebecca MacGowan, Dept. of Marketing, with Dr. Allison S. Gabriel, Department of Marketing, VCU School of Business and Dr. Jason J. Dahling, The College of New Jersey

Performance feedback is critical in helping employees perform and adjust to work demands. Because of this, a great deal of research has paid attention to the feedback environment, or contextual aspects of day-to-day supervisor-subordinate and coworker-coworker feedback relationships. Past research has utilized a variable-centered approach to study the seven facets of the feedback environment (e.g., feedback quality, feedback delivery, favorable feedback, feedback credibility, unfavorable feedback, source availability, promotion of feedback seeking,), forming a composite of the seven facets and linking this composite to outcomes (e.g., job satisfaction, organizational commitment, motivation, performance). Such analyses, however, ignore how the facets of the feedback environment may operate conjointly to predict outcomes. In the current paper, we utilize a person-centered approach to study the supervisor-subordinate and coworker-coworker feedback environment. Across two studies, we use latent profile analysis to identify unique feedback environment profiles, linking the profiles to antecedents (leader-member exchange, supervisor social support, and coworker social support) and outcomes (role clarity, perceptions of politics, job satisfaction, affective organizational commitment, and feedback seeking behavior). Our results indicate the existence of three supervisor feedback environments profiles (Unfavorable [low on all facets except unfavorable feedback], Moderate Quality, and High Quality [high on all facets except unfavorable feedback]) and four coworker feedback environment profiles (Unfavorable, Low Quality, Moderate Quality, and High Quality). High levels of leader-member exchange and social support resulted in greater likelihood of placement into the High Quality feedback environment profile. Participants identified to be in High Quality Feedback Environments also exhibited the best employee outcomes.

13. Chemical Profiling of Self-Igniting Mixture Residues - Implications for the Forensic Analysis of Arson-Related Crimes

Stephanie Harrold, Dept. of Forensic Science, with Monique Jones and Dr. Christopher Ehrhardt, Department of Forensic Science

Hypergolic mixtures are a significant threat to public safety and law enforcement. Because these reactions involve common household materials and are self-igniting, they have been used in a number of arson-related crimes as well as improvised explosive devices. One of the most common mixture recipes involves inorganic pool chlorine ($CaOCl_2$) and automotive brake fluid (polyethalyene glycol). Despite their prevalence, there are very few forensic

signatures that can be used to analyze evidence from a hypergolic reaction to determine its source during a forensic investigation. Therefore, the goal of this project was to investigate trace chemical variation across different types and commercial brands of inorganic pool chlorine as a potential forensic signature for the source of reactants used in the mixture. Concentrations of 24 different elements were measured using Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES). Results showed that different commercial brands of pool chlorine showed distinct variation in the concentration of aluminum, chromium, copper, potassium, nickel, and strontium which varied from 0ppm to >100ppm across sample sources. These differences were consistent in both precursors and post-reaction residues. Elemental concentration data was also analyzed using Discriminate Function Analysis (DFA), which showed robust multivariate separation between each source $CaOCl_2$. Overall these results indicate that statistically significant differences exist in trace elemental concentration across different sources of inorganic pool chlorine. These signatures may ultimately help forensic laboratories reverse engineer unknown hypergolic residues or provide a means to link evidence from a crime scene to suspects, places, or other crimes relevant to an investigation.

14. Malnutrition in Guatemala

David Brygider, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

First to understand why there is such gross malnutrition in Guatemala is it important to understand the economy of the state itself. In the United Nations Human Development Index Guatemala ranks near the bottom of the pack coming in at 133 out of 187, and the gross national income is about $2700 US (Ref. 1). 13% of Guatemala's people live in categorized extreme poverty, where 53% live in general poverty. What are the reasons that conditions are so poor in this country? Guatemala is prone to earthquakes, drought, floods, and landslides. These are frequent and repetitive natural disasters that further push the nation's economic stability into ruin. Poverty, natural disasters, and lack of education are preventing Guatemalans from having successful campaigns against malnutrition. To effectively fix the problem, an educational approach should be taken to teach the people how to be successful agriculturally, instead of quick aide benefits where the people receive handouts to fix the initial problem of hunger, but not the ongoing problem of malnutrition.

15. Re-thinking Childhood Intervention: Positive Behavioral Development through Non-familial Socialization

Anthony Jones, Depts. of Sociology and International Studies, with Prof. Mary Boyes, VCU Honors College

Although it is understood that parental involvement and the interactions shared between parent and child—social capital—is a primary determinant of positive behavioral development, national- and state-funded childhood development programs for low-socioeconomic status (SES) students have yet to make social capital a primary component of their program curricula. Through analysis of multiple longitudinal studies and childhood

intervention curricula, I have found that no matter the relationship a child has with an adult, familial or non-familial, social capital can be provided to the child. An early intervention program that pairs disadvantaged adolescents with non-familial adults could have a positive, long-term impact on the behavioral development of adolescents because of the social capital that the non-familial adults could provide. The socialization-focused program would be more feasible for low-SES families as the program would not require any adjustment to the lifestyles of the families. Current early intervention strategies meant to increase the chances of positive outcomes for low-SES children are not designed to improve behavior, but instead provide immediate support using limited community resources. My findings support the hypothesis that a socialization-focused intervention program could better develop children's behaviors. This fundamental change in behavior could give the children the support needed to build a lasting resistance to the negative social influences present in impoverished environments. The non-familial adults in the program would need to meet certain criteria to ensure positive development for the child, including: being accessible to the child in a similar capacity of an adolescent peer relationship; assuming responsibility for the child's development behaviorally and socially; and creating an equal social relationship, as opposed to an authoritative parent- or teacher-child relationship. This program could be a working model to be implemented both in the U.S. and internationally.

16. Method in the Madness: A Modern Structural-Functionalist Analysis of Zombification in South Africa, Haiti, and the United States.

Ashley Perry, Dept. of Anthropology, with Dr. Bernard Means, Department of Anthropology

Zombies fill our bookshelves, televisions, and movie screens – and, on occasion, our streets with the recent advent of "zombie walks." But where do these characters come from and – maybe more importantly – where are they going? In many regions the literary record shows a relatively sparse record of zombie mythology when compared with characters like the vampire or werewolf. Nonetheless, it can still boast a rather rich oral history and evolution. The aim of my research is to analyze the zombie's function within and across three different cultural contexts – South Africa, Haiti, and the United States. I pay particular attention to the extent to which the zombie functions in the role of scapegoat to explain unexpected misfortunes, illness and death, and contemporary social injustices. More than this, my goal is to offer an explanation based heavily on structural-functionalist theory as to *why* zombie mythological concepts have persisted into modern day culture where they have not only permeated popular literature and media, as well as reality, but also thrived in present day context.

17. Queer-baiting on the BBC's Sherlock: Addressing the Invalidation of Queer Experience through Online Fan Fiction Communities

Cassidy Sheehan, Dept. of English, with Prof. Mary Boyes, VCU Honors College

Fans of a particular media source often write fan fiction to build on, deviate from, and transform original source material. The BBC's *Sherlock* is not exempt from this common practice; in fact, the homoerotic subtext which persistently endures within the show lends itself to the production of slash fan fiction. Many perceive this subtext as a method of queer-baiting,

or an ultimately harmful tactic used by writers and producers to lure in queer viewers. In this paper, dialogue and scenes from the show itself are compared to excerpts from works of fan fiction in order to explore reactions to queer-baiting within fan communities. Commentary from creators of the show, Steven Moffat and Mark Gatiss, is also examined to show how queer possibility has been denied on *Sherlock*. It will become apparent that quality television representation of queer individuals is necessary for healthy queer identity development; it will also be seen how young queer fans create communities on the internet—such as those for reading, writing, and critiquing fan fiction—as safe havens for exploring their identities free from typical stigmatization. These internet fan communities become spaces for queer discourse and activism, especially in drawing attention to and subverting heterosexual norms, such as those which exist on *Sherlock* and in our society. By challenging these heteronormative standards, queer fans are addressing the invalidation of their lived experiences, as well as other issues they face every day, and may have a hand in inducing larger cultural change.

18. Characterization of Molecular Probes for human RAD52 Repair Protein

Filius Iyebote, Dept. of Biology, with Dr. Jenny Wilkerson, Department of Pharmacology and Toxicology

Human RAD52 (hsRAD52) plays a pertinent role in Homology Directed Damage Repair (HDDR) and in supporting faithful genome duplication , but there is still high ambiguity in what biochemical activities and cellular function underlie this role. There is much known about Rad52 activities in yeast cells (*saccharomyces cerevisiae,* scRad52), which functions by annealing of two complementary single stranded DNA (ssDNA) molecules bound by Replication Protein A (RPA), and also serves as a recombination mediator which replaces scRPA with scRad51 recombinase. ScRad52 uses these two biochemical activities to maintain genomic integrity after double stranded breaks via two mechanisms, homologous recombination (HR) and single stranded annealing (SSA). There are similarities between scRad52 and hsRAD52, but the two proteins are not identical. Biochemically, hsRAD52 was shown to mediate annealing of hsRPA-coated ssDNA, but demonstrated no detectable recombination mediator activity, the role played in human cells by BRCA2 tumor suppressor protein.In healthy mammalian cells RAD52 is expendable, but its inactivation leads to cell death when combined with deficiencies in the tumor suppressor genes BRCA1 and BRCA2 commonly mutated in hereditary and sporadic breast cancers. This phenomenon is known as synthetic lethality; which is the simultaneous inactivation/mutation of two or more genes that lead to cell death, whereas the inactivation/mutation of only one of these genes does not affect the cells viability. Synthetic lethality between hsRAD52 deletion and BRCA-deficiency makes RAD52 an attractive breast cancer drug target, and specifically RAD52 ability to bind ssDNA in a geometrically distinct wrapped configuration, which may be important for all of its critical cellular functions. Using Förster resonance energy transfer, FRET-based high throughput screening (HTS) assay we have several small-molecule compounds that perturb the RAD52-ssDNA complex. Here, I will describe detailed biochemical characterization of several of the identified compounds and their ability to perturb hsRAD52-ssDNA complex. The obtained knowledge (structures of the compounds combined with their potency) will be used in the ligand centered cheminformatics approaches to identify novel potent inhibitor scaffolds. These scaffolds will be further developed into anti-cancer drugs and molecular probes for dissecting hsRAD52 cellular role.

19. Humility and Relationship Outcomes During the Transition to Parenthood

Ciera Cannizzaro, Rasha Manoppo, Sabrina Marrero, with Rachel Garthe and Dr. Everett Worthington, Department of Psychology

The transition to parenthood can be one of the most rewarding experiences in ones lifetime. But it can also be the most stressful and the most confusing part of ones life that affects not only the child but also affects the commitment and relationship between mother and father. A few studies have looked into the effect of transitioning to parenthood in individual physiological and unit martial aspects. Research suggests that levels of commitment and humility can fluctuate during the transition to parenthood (Kamp Dush et al., 2014), in addition to many neurological, physiological and hormonal changes taking place (Rutherford et al., 2015). Specifically, recent research has examined how humility in committed relationships may be related to relationship satisfaction. One study found that humility is important for both the formation and repair of romantic relationships (van Tongeren et al., 2014). Another study found that humility is a mechanism for increased relationships satisfaction and forgiveness between partners (Farrell et al., 2015). Together, these results suggest that people are more satisfied in their romantic relationships when they view their partner as more humble. However, no research to our knowledge has explored how humility may influence relationship outcomes during the transition to parenthood. The current study explored relational humility and relationship commitment during the transition to parenthood. Participants were 69 heterosexual married couples (N=138) who were transitioning into being parents for the first time. Participants were 72% Caucasian, ages from 22-48 (M=30.8, SD=4.76). There were three scales used for this study. The Relational Humility Scale (RHS; Davis et al., 2011) was utilized to assess humility in couples. The Commitment Inventory (Stanley & Markman, 1992) was also used to measure commitment among couples. The Dyadic Adjustment Scale (Spanier, 1976) measured relationship satisfaction. Preliminary results showed that relational humility was associated with higher levels of commitment (r = 0.20), and aspects of relational satisfaction, including partner cohesion (r = 0.35), affectional expression (r = .28) and partner consensus (r = 0.32). Multiple regressions will be run to see if relational humility predicts these relational variables.

20. The Increase of Non-consensual Bride Kidnapping in Kyrgyzstan after the Fall of the Soviet Union

Amna Nawaz, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

Since the fall of the Soviet Union, the country of Kyrgyzstan has had an unprecedented jump in bride kidnapping. The number of occurrences has skyrocketed and with that so has the severity of the violence. In this time women are taken, with no prior indication of when or how, and forced to marry their kidnappers. This non-consensual practice has morphed for reasons unknown. To stop the increasingly abysmal state of women's rights in Kyrgyzstan, and in countries all of over the world, I aimed to discover why people turned towards violence and lack of consent in the 1990's. To determine the cause of the rise in bride kidnapping, I reviewed ten social science journal articles. These articles varied from topics on the bump in bride kidnapping to the nature of familial relations in Kyrgyzstan prior to and after the rise of the

Soviet Union. I found that after the Soviet Union fell from power, the Kyrgyz people sought to define and reclaim their Kyrgyz identity by clinging to practices they believed were inherently Kyrgyz. The Kyrgyz men believe bride kidnapping to be a traditional Kyrgyz practice that not only reaffirms their Kyrgyz background but also their masculinity as they impose their will over women. However, contrary to the beliefs of the Kyrgyz people, bride kidnapping has no substantial history of being a tradition of Kyrgyzstan. This means that the Kyrgyz people have defined their identity and committed crimes against their own women due to an incorrect assumption about their traditions. In order to reverse the trend of increasingly violent and non-consensual bride abduction, further research must be done on why the Kyrgyz people believe that kidnapping women for marriage maintains Kyrgyz heritage.

21. Relationship between benzodiazepines and Alzheimer's type dementia.

Shray Amin, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

There is an ever-increasing circulation of benzodiazepines, a breed of psychoactive drugs that are commonly prescribed as an anticonvulsant, anti-insomniac, or as anti-anxiety medication. However, they are suspected of causing cognitive deficiencies, possibly even Alzheimer's type dementia; and because of its widespread use, the implications associated with taking the drug must be further understood in order to prevent unnecessary casualties among users. In response, I searched for a solution to the question "can the chronic use of benzodiazepines lead to an eventual cognitive decline, if not Alzheimer's type dementia?" I therefore analyzed pharmacoepidemiolgy journals and case studies investigating the possible direct association or disassociation between benzodiazepines and Alzheimer's disease. Additionally, I examined medical journals that revealed an indirect association between the disease and drug. The culmination of my research found that the case studies and/or journal articles either concluded the existence of a direct association, a direct disassociation, or an indirect association between the utilization of the drug and an increased risk of developing Alzheimer's, denoting that current studies are divided in their outcomes. Although, there is not a consensus on the relation between benzodiazepines and Alzheimer's type dementia, there is an obvious correlation between the two, as evidenced by multiple studies that have indicated the association between the use of the drug and the disease. This incongruity likely stems from the lack of substantiated research conducted on the topic; therefore, because of these discrepant findings, it is necessary for scholars to further investigate this relation to increase the confidence of a definitive conclusion.

22. Malnourishment and food scarcity in Guatemala

Jessica Bowers, Dept. of Psychology, with Dr. Jason Levy, Department of Homeland Security and Emergency Preparedness

Food insecurity and malnutrition is a huge problem sweeping Guatemala. Some of the biggest victims of this are children under five, 50% of children under five in Guatemala are chronically malnourished, this is the highest rate of child malnutrition in Latin America (Woodruff 2014).

Because of this malnutrition, children face various problematic outcomes; stunt growth, increased rates of infection and disease, and even lower IQ. These problems do not only face these children in their current state but they will affect their future as well. Unfortunately Guatemala people face food scarcity, as a result, they do not have access to meat and only very few vegetables. Generally they rely on a meal of only beans, lacking so many vitamins and minerals that these children need to develop properly (Sreenivasan 2014). Because of this malnutrition, Mayan people face stunted growth as children. In the past in was though that Mayans just had an average shorter height then other ethnic groups, this unfortunately has proven to be wrong. The height discrepancy is due to food scarcity Mayan people face.

23. Poverty in Guatemala

Neil DeAbreu, Dept. of Criminal Justice, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Poverty is one of the main issues affecting the country of Guatemala. It is the reason for violence, corruption, and many of the youth development issues. In 2000, over half of the country lived in poverty. One of the main problems Guatemala has had with its economy is that its government is not able to effectively collect taxes. Many of its citizens do not have formal jobs and many businesses evade their taxes. The citizens of Guatemala have a poor education and are unable to qualify for many entry-level jobs that would help support their families. Without an education, they cannot learn the skills necessary to perform entry-level jobs. Households headed by women also suffer from poverty due to limited access to resources, education, and opportunities in the country. It is important to identify the factors that contribute to the poverty rates in Guatemala but what are they? How long will it take for Guatemala's economy to change? Each of these factors must be addressed in order to provide proper solutions and get the country back on its feet. One solution that can aid Guatemala is an increase in tax revenue by the government. It is highly unlikely that an event like this would occur though. It would also punish the poor more than the rich because they do not earn enough money to begin with. More schools and teachers need to be provided in order for children and even adults to receive the proper education necessary to receive entry-level positions and eventually move up. Overall, people just need access to basic resources in order for the country to change. They need proper education and access to basic utilities in order to change the state of Guatemala.

24. Guatemala's Vulnerability to Natural Disasters

Matthew Martin, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

Guatemala is a Central American country that is highly susceptible to natural disasters (CIA, 2014). Several natural disasters including volcanic activity, earthquakes, hurricanes, landslides and sinkholes have severely impacted the Central American country throughout its history. In 2010, within the span of one week, Guatemala was hit with a volcanic eruption that rained ash and debris over Guatemala City and a tropical storm that opened a sinkhole that swallowed a building whole (NPR, 2010). The lack of proper preparedness for natural hazards

and disasters in Guatemala, leaves the country, infrastructure and its population vulnerable to disasters. In order to reduce the vulnerability level, the Guatemalan Government received The Guatemala Disaster Risk Management Development Policy Loan with a Catastrophe Deferred Drawdown Option (CAT DDO) and adopted the 2009-2011 National Program for Disaster Prevention and Mitigation (NPDPM), (The World Bank, 2013). The implementation of these programs makes needed resources available immediately after a declaration of emergency and allows the Government access to $85 million in disaster response funding (The World Bank, 2013). As a result of these programs, many solutions were made. Risk monitoring and forecasting was improved; hydro-meteorological and seismo- logical monitoring networks were improved and extended by 57 percent; vulnerability of public buildings to earthquakes was reduced; disaster risk information was implemented at the national and local level (The World Bank, 2013). The CAT DDO and NPDPM are programs which have resulted in solutions to reducing Guatemala's vulnerability to natural disasters.

25. Corruption in Guatemala

Vasily Borisov, Dept. of International Relations, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

As of 2014 Guatemala was ranked 115/175 on the corruption scale. This means that the police and government officials are more likely to take bribes, that there is an overwhelming black market within the country and that there is a big mistrust of the government. Such amount of corruption is dangerous because it signals instability and mistrust of the government. People are more likely to turn to gangs and guerilla groups for protection and to illegal activity for monetary income rather than to their own government and the public sector. The more influence the government loses the harder it will become to maintain stability and economic growth and the harder it becomes to deal with homeland threats that arise from the vacuum of power. Corruption also takes a huge economic toll on the country. The government is unable to provide basic political and social goods. The foreign aid from the international community is often misplaced. Even though Guatemala is rich with natural resources and has an inventive indigenous population, its economic future depends on its ability to cope with corruption, both on a public and political level.

26. Chemogenetic approaches to probe the role of astrocytes in the motivation for ethanol.

Ryan S. Poland, Depts. of Biology and Psychology, with Dr. M. Scott Bowers, Depts. of Psychiatry, Pharmacology and Toxicology, Virginia Institute for Psychiatric and Behavioral Genetics

Alcoholism is associated with adaptations that occur within discrete brain structures. Most of the literature has focused on neuron-mediated events, but recent work has shown that astrocytes have significant influence. We studied astrocytic adaptations to ethanol self-administration by measuring astrocyte density in the prefrontal cortex (PFC) and nucleus accumbens core (NAcore) and shell (NAshell) striatal subregions following 3 weeks abstinence from three ethanol (20% v/v) self-administration paradigms: continuous two-bottle ethanol access (CEA), intermittent two-bottle ethanol access (IEA), and operant ethanol access (OEA). Astrocyte number and packing density was determined using unbiased stereological measures

of cells expressing the astrocyte markers, glial fibrillary acidic protein (GFAP) and aldehyde dehydrogenase 1L1 (ALDH1L1). The number of astrocytes increased in the prelimbic and anterior cingulate, but not in the infralimbic or orbitofrontal cortices after IEA. After abstinence, the CEA cohort showed a reduction in astrocyte number in the prelimbic and orbitofrontal cortices. A reduction was also observed in the orbitofrontal cortex of the OEA cohort. We found the density of NAcore astrocytes expressing GFAP increased after 3wks abstinence. However, no density change was observed in the NAshell or NAcore astrocytes expressing ALDH1L1. Increased NAcore astrocyte density was positively correlated with increased motivation for ethanol after abstinence. We found that influencing the ability of astrocytes to communicate could shift this motivation. Specifically, the motivation to self-administer ethanol was increased when the communication between astrocytes was inhibited by gap channel blockade. Conversely, when the ability to communicate was enhanced, by activating Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) that were expressed in NAcore astrocytes, motivation to self-administer ethanol was decreased and responding for rewarding brain stimulation was enhanced. These data indicate that distinct limbic subregions differentially respond to ethanol consumption and that rat NAcore astrocytes play an important role in modulating the reinforcing efficacy of ethanol. Together, these data suggest that stimulating NAcore astrocytes may be an effective means of moderating Alcohol Use Disorders.

27. A Solution to Poverty in Guatemala City

Brandin Samuel, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

In the Republic of Guatemala, poverty is a widespread and ongoing problem. Approximately 51 percent of the population lives in the rural area, and the rural population is responsible for a large majority of the country's poorest people. Spending time in this completely underdeveloped country has been truly humbling experience. From my time at the preschool, realizing that their bathrooms were out-houses to eating several meals in the homes of the families realizing that they hardly have electricity, I got to understand exactly how this population lives on a daily basis. Young people are the most at risk and the most vulnerable in these highly concentrated among these indigenous countries. They account for over 40 percent of the total population. A recent government figure indicates that 7 of 10 people of indigenous decent live in poverty. Solving the problem of poverty has been a long unsuccessful process however if the problem were to get solved, it could open up completely new doors for the civilization. The purpose of this research is to find a potential solution to the ongoing problem of poverty in Guatemala. Guatemala is currently ranked 131 out 187 countries on the United Nations Development program. This program is a comparative measure of life expectancy, literacy, education and general standards of living for countries around the world. I think by attacking these aspects individually it would be a great start to solving this problem. Currently Guatemala has been capitalizing on its substantial natural resources and its climate advantages. Technoserve has been strengthening the coffee value chain, which has significantly helped existing agricultural businesses. This in turn has generated more jobs and steady incomes for poor rural producers. By partnering with over 12,000 small producers, Technoserve has promoted change across the coffee, biodiesel and vegetable markets in

Guatemala. By utilizing the strengths of this country, they can continue to grow and stabilize their economy opening up endless possibilities.

28. Polypharmacy and Symptoms of Pain in Women with Fibromyalgia

Anna Young, UROP Summer Research Fellow, School of Nursing, with Linda Barstow and Shelby Evans, School of Pharmacy, and Dr. Victoria Menzies, School of Nursing

Fibromyalgia (FMS), a syndrome characterized by chronic widespread pain (CWP), has no known etiology, and coincides with other life-altering symptoms including fatigue, mood disturbances and non-restorative sleep. Despite the multiple medication classes that are typically used for the treatment of FMS, there are no known studies assessing the efficacy of polypharmacy on symptoms of pain in this patient population. While analgesic medications, including opioid or opioid-like medications, are commonly prescribed, the use of these medications for FMS has not been fully described, including potential incidence of analgesic overuse. The primary purpose of this secondary analysis was to examine how many classes of pharmacologic agents were used in a sample of *N=122* women diagnosed with FMS, the relationships among baseline pain levels and medication use, controlling for self-reported levels of fatigue and depression. Data was collected from two separate studies: (a) a cross-sectional study to examine the relationship among stress, symptoms and immune markers in women (*N*=50) with FM, and (b) an RCT to examine the effect of a 10-week guided imagery intervention on stress, self-efficacy, symptoms and immunity in women (*N*=72) with FM. In both studies participants were asked to provide lists of currently prescribed medications for treatment of their FMS-related symptoms. Examination of the data revealed that participants were prescribed 6 different classes of medications. These included opioids analgesics, non-opioid analgesics, antidepressants, anticonvulsants, muscle relaxants, and benzodiazepines. Baseline pain severity scores (p=0.0106) and pain interference scores (p=0.0002) were significantly associated with opioid use as compared to those individuals who did not report opioid use. Study findings are considered preliminary data for development of a larger study to examine efficacy of polypharmacy and related potential risks of adverse effects or substance abuse in those with FMS. Supported by grants from NINR #P20 NR008988 (N. McCain, PI)*; #P30 NR011403 M. J. Grap (PI).*

29. Grassland species vary in tolerance to stressors associated with climate change

Audrey Kirschner and Julie C. Zinnert, Dept. of Biology, with Dr. Sarah Golding, Dept. of Biology

Climate change effects shift distributions of grass species that stabilize coastal sediments and offer protection to inland communities. Coastal species are sensitive to climate change as they are influenced by both atmospheric and oceanic drivers (i.e. changes in temperature, precipitation, and sea level rise). To understand the tolerance of coastal grasses to climate change stressors, our objective was to quantify responses of two dominant grassland species (*Spartina patens* and *Fimbristylis spadicea*) to saline flooding and drought stress. Field collected plants (n = 6) were subjected to varying levels of saline flooding (2, 5, 10, 15, and 20 g L^{-1}) and drought (well watered vs water withheld). Weekly measurements were taken for

functional traits and physiological responses, which included stomatal conductance (g_s), electron transport rate (ETR), water potential (ψ), tissue chlorides, and specific leaf area (SLA).

Both species exhibited physiological responses to increased salinity. Stomatal conductance (g_s) reduced significantly following initial treatment exposure and recovered briefly. *Spartina patens* recovered at levels of 5 g L^{-1} and *F. spadicea* recovered at levels of 10 g L^{-1}. SLA declined in both *S. patens* and *F. spadicea*, but was more reduced in *F. spadicea*. ETR significantly decreased for both *S. patens* and *F. spadicea*. Tissue chlorides were highest in saline flooded *F. spadicea* plants compared to *S. patens*. Drought treated plants had significant declines in g_s, ETR, and ψ. Overall, *Spartina patens* was more tolerant to saline flooding and drought treatments than *F. spadicea*. This outcome reflects the varied distribution of *S. patens* from drought induced dune environments to saline flooded marshes. *Spartina patens* is highly responsive to effects associated with atmospheric and oceanic drivers of climate change and is an important species in shaping coastal communities.

30. Decreased Pain Severity and Differential Gene Expression Following Calmare Therapy

Jeffrey B. Petraco, M.B.A., RN, UROP Summer Research Fellow, with Amy Heineman, RN, STAR Project Director, and Angela Starkweather, Ph.D., ACNP-BC, CNRN, Associate Professor and Chair, Adult Health and Nursing Systems Department, VCU School of Nursing

We present the results of a double-blinded randomized sham-controlled research study of a non-pharmacologic low back pain intervention. Calmare therapy is an neurocutanous electrical stimulation approach for pain management. The intervention group received Calmare therapy and the other received sham. Differences in pain severity and interference scores, pain sensitivity measures and gene expression profiles are reported. Patterns of downregulated gene expression suggest that Calmare may alter proteins involved in pain transduction may have implications for the treatment of other chronic pain conditions.

31. The effect of ion concentration on S. sanguinis growth and biofilm formation

Dylan Vu, Clinical and Translational Research Summer Fellow, Dept. of Biology, with Dr. Ping Xu, VCU School of Dentistry, Philips Institute for Oral Health Research

Streptococcus sanguinis is an oral bacteria that colonizes on teeth in layers known as biofilm. The bacteria is a primary colonizer, meaning that other bacteria and pathogens can grow on top of the biofilm. This can lead to a community of Gram-negative, filamentous organisms and oral pathogens in the mouth, as well as infection. This experiment tested the effect of different ion concentrations on the biofilm formation of wild type *S. sanguinis* and various mutant genes in chemically defined medium. Certain concentrations of AgNO3, CuSO4, and ZnSO4 reduced biofilm formation completely, while other ions like FeSO4 weakened biofilms. When comparing the initial bacterial growth to biofilm formation, it was found that a decrease in growth was accompanied by a decrease in biofilm. Therefore the majority of ions likely did not only affect biofilm formation, rather they were toxic and killed the bacteria. The results of the experiment indicate which ions could be used for future research on how to control *S. sanguinis* biofilm formation *in vivo*. As the ranges of ion concentrations were so small

(0-0.3 grams/liter), it demonstrates how such a minor change can have a large impact on a microbiome.

32. The Modern Sino-Industrial Revolution: What the US Industrial Revolution can tell us about China's future

Leon Jia, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

In a relatively short span of time, China has become a superpower in the global economy, with a GDP that has risen by an average of 10.4% since 2000. This growth comes from economic reform that is opening China's vast resources and labor to the foreign markets and bringing in new technologies, increases in productivity and social change. This kind of progress has striking similarities to the Industrial Revolution in the United States in the 1800s to the beginning of WWI. The purpose of this study is to compare the Chinese economy to the US Industrial Revolution and offer the idea of a modern "Sino-Industrial Revolution." The primary focus of this study was to create a multiple linear regression model of the US (1878-1913) and use it to predict Chinese economic growth (1995-2010) with a secondary focus on similarities in environmental problems, social issues and foreign relations. Three multiple linear regression models were constructed with nine variables: patent applications, mineral consumption, fuelwood consumption, automobile registration (model 1), merchandise exports, manufacturing (model 2), urban, rural and total population (model 3). Data from the US was taken from the 1975 Historical Statistics while data from China was taken from the World Bank; the years chosen were based on data availability. When the three models used Chinese data to predict GNI growth, there was poor predicting power of accuracy, but very strong correlation of 96.4% and 98.4% for Model 1 and 2, respectively. However, for Model 3, the correlation was -93.6% because from 1878-1913, the US rural population increased although slower than the rapid urbanization that the model was created to show in comparison to that in China. China has experienced a decrease in rural population and too much power placed on the rural population data that led to the prediction of negative GNI growth. Other similarities include environmental problems with air and water quality, social liberalization and urbanization, and a policy of aggressive expansionism. Given the success of China's 12th Five-Year Plan, no major financial crises or armed conflict, I predict that Chinese growth will continue in the near future. The similarities and economic correlation between the both countries in their respective time periods could be a valuable tool for predicting future growth and the concept of a 'Sino-Industrial Revolution' should be studied more in depth.

33. The Role of Patient and Physician in Establishing Patient-Physician Communication in the In-Patient Environment

Tamanna Sahni, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

Communication in the in-patient environment is crucial, and the relationship between a patient and physician enhances patient health and wellness. Patients should feel confident with their abilities to feel comfortable conversing with physicians, which would thus treat symptoms more effectively. This communication has decreased over time, hence patients are often are unable to obtain medical information from their healthcare providers. What is the relationship between psychological factors, such as self-esteem, and quality of patient-physician communication? And can physicians ensure increased patient comfort in the medical environment? Various factors can affect the patients' comfort with their physicians, and when addressed, these factors can help improve patient-physician communication. I explored

articles that analyzed the effect of language barriers, the role of familial support in the mental strength of the patient, and the effect of increased time spent online on communication. All of these aspects lead to a disparity between the patient and the physician as the patient cannot adequately communicate himself as a result of a lack of confidence and support, thus putting the responsibility on the part of the healthcare provider. Physicians have the ability to create a comforting environment for the patient and need to take a more active role in patients' lives and provide more resources to communicate their concerns effectively to help the patient feel secure and comfortable in the medical environment. This change will thus enable patients to work alongside their physicians in managing their health to allow improvement of communication as well as overall patient health.

34. An examination of a causal link between anesthesia and peripheral blood flow

Leon Jia, UROP Summer Research Fellow, Dept. of Biology, with Dr. Christian Falyer, Department of Nurse Anesthesia

Perioperative peripheral nerve injury continues to be problematic within the surgical community, often resulting in chronic pain, disability, decreased quality of life and increased hospital stays. First described in the 1800's, peripheral nerve injury represents the second largest groups of claims in both the American Society of Anesthesiologists (ASA) and the American Association of Nurse Anesthetists Foundation (AANAF) Closed Claims Databases. According to an ASA report evaluating current standards for preventing peripheral neuropathies related to surgical positioning, exact mechanisms of injury are often unclear and prevention strategies are not readily apparent. While many theories attempt to explain the cause of perioperative nerve injury, ischemia is a likely critical event in many of these injuries. General anesthesia has a vasodialating effect on the vascular system. The theory behind this study is that with increased volume of the vascular bed, the pulsatility index and resistance index will decrease, thus less blood will go into the periphery causing ischemia. In the course of this study, 36 patients were chosen to participate determined by the length of surgery, type of anesthesia, accessibility to the arms during surgery, and surgical positioning. They were consented and the brachial arteries were scanned bilaterally mid-humerus in the preoperative setting, within 15 minutes of induction, and at 45 minutes post-induction. It was concluded that pulsatility and resistance do decrease significantly and could very well exacerbate an ischemic event that could lead to neuropathy. However, further studies need to be conducted in order to measure nerve transduction during surgery.

35. Spatial Analysis of Nest Productivity and Predation in Prothonotary Warblers

Miranda Foster, Dept. of Environmental Studies, with Dr. Lesley Bulluck, Dept. of Biology

Generally, statistics are based off the assumption that observations are independent from each other in space. In larger ecological systems however, there can be spatial autocorrelation whereby data collected in nearby areas are not independent of one another which violates the assumption of most statistical tests. It is therefore becoming commonplace for ecological studies to study spatial autocorrelation to both eliminate error (accounting for a nuisance variable that could give false positives) and to better understand the spatial structure of their system of interest. Indeed, the mechanisms that lead to spatial autocorrelation are

often associated with behaviors and/or intrinsic characteristics of our target species or community. In this study we investigated whether nest productivity and nest predation of the Prothonotary Warbler (Prothonotaria Citrea) were spatially autocorrelated at Deep Bottom Park along the lower James River, VA. Nest success and predation were measured at 66 different nest boxes over a period of four years (2009-2013). We found no spatial autocorrelation between these nest boxes when analyzing both reproductive success and nest predation events. This indicates that our observations are independent from each other in space, and spatial variables are not driving reproductive success or predation, rather individual bird quality is likely the main driver for these differences.

36. Collagen 1 Gene Expression in Smad7Knockout from renal tissue

Farrah Hermes, Dept. of Bioinformatics, with Dr. Jeffrey Elhai, Dept. of Bioinformatics

Renal fibrosis, a major obstruction in kidney function, is identified by an over production and accumulation of fibroblast cells in the extracellular matrix in kidney cells. Signaling pathways between the Smad family and the Transforming Growth Factor-beta (TGF-b) superfamily have been identified to have downstream effects on the expression of cells that accumulate in the extracellular matrix. Smad7 is an inhibitor Smad and it blocks Smad3 phosphorylation by inhibiting TGF-b signaling. This interaction helps prevent the overexpression of Smad3 that leads to the over production of collagen gene transcription. In this experiment, healthy renal tissue from the mice will be used measure the levels of the collagen 1 gene mRNA expression in a Smad7 conditional knock out model. The outcome of this experiment can give insight of how renal fibrosis develops in diseased kidneys before the onset of renal fibrosis.

37. Are more ornamented females better mothers? A study of feather reflectance and nestling provisioning in prothonotary warblers (Protonotaria citrea)

Ethan Cox, Dept. of Biology, with Dr. Lesley Bulluck, Department of Biology

While it is well established that male ornamentation in birds is a primary factor in sexual selection, the purpose of female ornamentation is less clear. Prothonotary warblers (PROW) display carotene-based, yellow plumage which is present but comparatively muted in females. Carotenoid pigments are unique compared to other pigments in that they cannot be synthesized by animals and therefore must be acquired in the diet. As a result, these pigments may serve as an honest indicator of individual quality, and data from a variety of birds suggest this is the case. Few studies assessing the relationship between carotenoid ornaments and individual quality have assessed the correlation between female ornamentation and parental quality as measured by nestling provisioning. To test this relationship, I have monitored a population of PROW females throughout the breeding season. Specifically, I collected breast and crown feathers from each individual female and used video surveillance equipment to quantify her nestling provisioning behavior: the number of visits/chick/hr. Plumage metrics of breast and crown feathers were quantified by reflectance spectroscopy, specifically by calculating violet blue chroma, which is inversely related to carotenoid content, and yellow intensity. Even while accounting for male provisioning rates, carotenoid content of the breast feathers was a significant predictor of female provisioning among prothonotary warbler females.

No relationship was found between plumage crown feather color metrics and provisioning. Considering these results, my study appears to support the good parent hypothesis, which suggests that brightly colored plumage is a signal of a females parental quality, specifically that she is capable of meeting the nutritional needs of her offspring.

38. The Transition to Parenthood: The Role of Humility, Gratitude and Forgiveness

Charlene Gaw, Elisabeth Alison and Azza Hussein with Rachel Garthe and Dr. Everett Worthington, Jr., Dept. of Psychology

The transition to parenthood, while an exciting time to celebrate the life of their child, causes parents to face new challenges such as physical exhaustion (Petch & Halford, 2008), role overload (Perry-Jenkins, Goldberg, Pierce, & Sayer, 2007), and less time for themselves and their partners (Feeney, Hohaus, Noller, & Alexander, 2001). Today in the United States, 85% of women and 76% of men will have parented a child by the time they are forty (Roy, Schumm, & Britt, 2014), making this an important developmental transition to examine. Humility has been found to have numerous social benefits, among them the initiation and maintenance of romantic relationships (van Tongeren, Davis, & Hook, 2014). Prior studies have found that greater humility in romantic relationships increases relationship satisfaction and forgiveness (Farrell et al., 2015). Gratitude may also increase relationship satisfaction and commitment (Joel et al., 2013), and humility and gratitude may be related (Kruse et al., 2014). The current study sought to examine how humility is related to other virtues (i.e., gratitude and forgiveness) during the transition to parenthood.

Participants included 69 heterosexual married couples (N = 138) that were expecting their first child. 72% were Caucasian and ranged in age from 22 to 48 (M = 30.8, SD = 4.76). Relational humility was assessed through behavioral coding with three observers who were female undergraduate research assistants. Observers obtained 80% or higher in reliability. The Relational Humility Scale (RHS; Davis et al., 2011) was used to measure humility in relationship partners. Other measures included Trait Forgiveness Scale (Berry et al., 2005) and the Gratitude Questionnaire (McCullough et al., 2002).

Preliminary results examined correlations between study variables. Relational humility was positively correlated with forgiveness (r = 0.28) and gratitude (r = 0.33). A multiple regression analysis will be run to see if relational humility is associated with higher levels of forgiveness and gratitude. Additionally, analyses will be run to compare results according measurements of relational humility (i.e., self-report versus behavioral coding). Implications of this work would benefit new parents by promoting the virtues that support healthy and successful relationships during the transition to parenthood.

39. The Effects of Nocodazole on Orofacial Development in Xenopus laveis

Christine Mai, Dept. of Biology, with Dr. Amanda Dickinson, Department of Biology

The orofacial region of human is important as it is the gateway for our interactions with the environment, food ingestion, and communication. When studying orofacial development, it can easily be seen in *Xenopus laevis*. In this experiment, the drug nocodazole, an anti-neoplastic that inhibits the formation of microtubules, was used to determine its effect on buccopharyngeal membrane proliferation (BM) rupture which is necessary for mouth opening in *Xenopus laevis*. The effects were determined by comparing measurements of the control vs. treated embryos.

40. Analysis of standard DNA procedures on museum specimen and research collection samples of late 19th to late-20th century Osprey (*Pandion haliaetus*)

Alia Hamdan, Depts. of Biology and Environmental Studies, with Prof. Catherine Viverette, Center for Environmental Studies

Historic events, both short and long-term, impact a species' contemporary population genetic structure. Understanding the effect of historic events is important to predicting response to future environmental changes, especially for species of conservation concern. Osprey (*Pandion haliaetus*) populations experienced steep declines after widespread organochloride pesticide (e.g. DDT) use in the mid-twentieth century. Most populations have rebounded since banning DDT, however, the impact on osprey populations is still unknown. This study examined 82 feather samples of *P. haliaetus* from the late 19th to late-20th century. Forty-one of these samples were collected from a natural history museum and 41 were from a university research collection. The object of this study was to determine if these feather samples could be used for molecular analysis of pre- and post-DDT effects in Osprey population genetic structure. A secondary objective is to promote the use of museum and research collection samples in research; this avenue offers a noninvasive technique for wildlife studies through easily accessible materials and can provide a better foundation to unlock genetic history for comparison studies. Using standard genetics procedures, we examined the efficacy of commonly used and commercially available extraction kits on the samples. These procedures using microsatellite primers (forward primer: [HEX]TGCATCCTAATGAACCTTTGC; reverse primer: AGGCTGGTGGTTAAACATGG) resulted in 47 successful amplification signals out of 82 samples, with 39 out of the research collection and 8 from the museum feathers, including a 70 year-old sample from 1945. These results show that historic feather samples can be used, yielding viable DNA for population genetic studies.

41. Drug Trafficking in Guatemala

Ahmed Fouad, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Department of Homeland Security and Emergency Preparedness

The illegal drug trade in Guatemala includes the shipping of cocaine to the United States. Mexican drug cartels have supposedly formed poppy growing operations there. One of the cartels is the Sinaloa, according to officials. It is rumored that the Mexican Los Zetas and the Guatemalan Kaibiles military forces have a relationship with each other. Guatemala is the connecting route that Honduras and Mexico use to transport drugs from Central America to the United States. It has an unguarded coastline, which makes it an easy access location for

boats and planes to pick up shipments to transport from South America. Their borders are under patrolled therefore the customs are ill prepared to halt the transportations. Guatemala is being abused by Honduras and Mexico for its easy transportation routes. To stop this from happening, Guatemala needs to better equip their border and customs patrol. The biggest problem is the reported relationship that exists between the Mexican Los Zetas cartel and the Guatemalan Kaibiles government forces. If the military is working with the cartel under the table something has to be done to stop this in order for Guatemala to end the drug trafficking. As long as the drugs stay out of Guatemala then it will become possible for them grow as a country.

42. The Use of Tailored Information to Increase Immunization Rates Among Children of Vaccine-Hesitant Parents

Keegan Edgar, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

In recent years, the number of parents who have refused immunizations or altered immunization schedules for their children has risen. Although non-immunization does occur in some cases for very legitimate reasons, those rates have stayed steady, while the number of parents declining for personal belief reasons has increased significantly. This has caused an increased number of outbreaks of vaccine-preventable diseases. It has also threatened herd immunity, which provides a measure of protection for those who are susceptible to disease given enough people are vaccinated, as this hinders the spread of the disease. Because no vaccine is one hundred percent effective and there are individuals who cannot be immunized for health reasons, herd immunity is important to prevent the spread of vaccine-preventable diseases. To combat this threat to herd immunity, it is becoming increasingly necessary to find a solution to the problem of increasing personal belief exemption. I took a cause and effect approach in the way I researched the issue. In order to determine the best method for increasing the rate of immunization among children of vaccine-hesitant parents, I first analyzed the causes of vaccine-hesitancy. The overarching theme that emerged was that vaccine-hesitant parents believed that not enough attention was being paid to their child; doctors gave only general recommendations rather than specific ones. Then, I began exploring the way the problem was already being addressed. Although there are many specific policies in place in individual cities, states and individual countries, the two general methods were by incentivizing immunization or using tailored techniques. These two methods were then analyzed for their ability to increase immunization rates in these children. Incentivizing vaccination was found to be much less effective because it doesn't address the concerns of the parents, and because most vaccine-hesitant parents are adamant in their beliefs. Tailoring information to give to parents is the more effective method because it alleviates the concerns of vaccine-hesitant parents, causing them to reevaluate their beliefs and often immunize their children. However, in order for this method to be effective, healthcare workers must have greater education regarding vaccine risks and side effects as well as addressing these concerns in an effective manner. Education of healthcare workers needs to emphasize these aspects to ensure the effectiveness of tailored approaches to increasing immunization rates among children of vaccine-hesitant parents.

43. Narco-trafficking and Perpetuated Violence in Guatemala

Ima Haque, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Department of Homeland Security and Emergency Preparedness

Over the years drug cartels have made their way into Guatemala through their borders. Drug trafficking is the main reason why the border between Guatemala and Honduras is one of the most violent locations in Central America. Due to lawlessness and corruption, wealthy drug traffickers assume an authoritative role in the region (Crisis Group, 2014). A 2010 report done by U.S. International Narcotics Control Strategy says that "Guatamala is the epicenter of the drug threat." (Brice, CNN, 2011). However, the increase in drug related violence is due to Zetas, a Mexican drug cartel. The criminal gangs from Zetas have so much power that their permission is required to enter and leave certain neighborhoods and streets in Guatemala. Narco-trafficking related crimes also includes kidnapping. The amount of missing persons has increased to 207 percent from 2009 to 2013 (OASC, 2014). Kidnapping occurs so that drug traffickers can demand ransom and they have a reputation of killing the victim even after a ransom has been paid. A recommendation to solve the drug trafficking problem in Guatemala would be to fix the corruption which permeates throughout the Guatemalan government, including the police forces. After dealing with governmental and political corruption, there will be a better chance to properly train and equip the police forces in order to prevent gangsters and traffickers from having power in the streets. Drug trafficking is the gateway to many other crimes in Guatemala and is the core reason why there is so much violence and unease in the State. Fixing up the government is necessary for the livelihood of the Guatemalan people.

44. Changes in Malaria Prevention Due to Political Restructuring of Mozambique and South Africa

Nirmala Shivakumar, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

The UN's current Millennium Development Goal puts pressure on many countries to decrease malaria incidence by 2015, including Mozambique and South Africa. While Mozambique and South Africa have continually worked to decrease malaria incidence for the last five decades, neither country can claim elimination of disease by UN standards. This study analyzes the changes in political structure and the simultaneous changes in the malaria prevention programs of Mozambique and South Africa after the end of their respective civil wars in 1992 and 1994. This study analyzed public health, historical, and social science journal articles. This study examined political power distribution, primary healthcare, and malaria prevention strategies, and community perception of healthcare to identify the different political dynamics affecting malaria incidence control in Mozambique and South Africa. This study identified that while Mozambique heavily financially dependent, strong community structure, and general malaria outbreaks compared to South Africa's economic independence, phasing out of private health care, and localized strong malaria epidemics, showcase the difference between the status of the two countries in malaria elimination. As bordering countries, the elimination of malaria in the two countries is tied together. The migration of people in between and the pre-existing organizations working in between the two countries showcase that South Africa and Mozambique must work together to eliminate malaria. A potential international cooperation agreement between South Africa and Mozambique that allows the two countries to help each other financially, through research, and management of malaria prevention resources would help eliminate malaria, while keeping the countries moderately independent of external aid.

45. Potential Microbe Water Filter Using Pinus taeda Xylem

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According to the World Health Organization (WHO), over one billion people on Earth lack access to potable water. Many countries lack funding or proper infrastructure to utilize current methods of removing microbes from water, such as ultraviolet radiation and chlorination. WHO directs that microbial safe drinking water tests negative for coliform and particles larger than two to five micrometers. Conifer xylem was identified as a potential microbe filter because of the pores measuring a maximum of 500 nanometers, making the material capable of filtering out microbes on the micrometer scale. Additionally, conifer xylem naturally conducts water, which would help large volumes of water flow through uninhibited. This study will examine *Pinus taeda* xylem as a potential water microbe filter, using dye particles as substitutes for microbes. The study will also identify other parameters that could affect the ability of a conifer species to filter microbes. Depending on the conifer species and growth environment, the conifer xylem could have varying levels of cavitation, pore size, water conduction, and material biodegradation, which could lead to different capabilities in water microbial filtration. Eventual optimization of these factors could lead to the development of an inexpensive and versatile solution to producing large amounts of drinking water to any part of the world.

46. Prenatal Nicotine Exposure as a Teratogen in Neurological Pathways

Monica Grover, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College

Attention-deficit/hyperactivity disorder (ADHD) is the most heritable and commonly diagnosed childhood psychiatric disorder, as 4% children have the disorder. Prenatal smoking has been found to be a risk factor for ADHD, a disorder that has been believed to be linked to a fluctuation of dopamine levels. Prenatal nicotine exposure in the second trimester influences dopaminergic neurological pathways by altering dopamine release levels. The altered dopamine levels make the fetus brain more sensitive to the nicotine, causing the nicotine exposure to be more dangerous in causing ADHD symptoms. In the present study, scientific articles were synthesized and analyzed in detail. Parallels were drawn and close readings were done in order to make conclusions. Prenatal nicotine exposure alters the neurological pathway of the neurotransmitters, ACh and dopamine, not only in the fetus but later in adolescence too. When nicotine enters the body, it is distributed quickly through the bloodstream and into the CNS. Cigarette smoke interferes with customary placental function, and therefore the flow of nutrients and oxygen. The nAChRs increases the amount of dopamine released in the synaptic area. Functional changes in DRD4 receptors and in dopamine transporter number caused by genetic variations and prenatal smoking exposure results in changes in dopamine release. The relationship between prenatal nicotine exposure and ADHD symptoms was not changed by sociodemographic factors. Interventions should be set-up in order to urge women to quit smoking during their pregnancy. The present study has health significance in that the research will urge pregnant women to be cautious of smoking.

47. Ocean Exploration in Film: Analyzing the Influence of Well-Known Films on the American Audience's Perception of Undersea Exploration

Tori Lusik, Dept. of Cinema, with Prof. Mary Boyes, VCU Honors College

Abstract: By 2014, America has reached a point where film media is easily accessible and acts as both an entertainment device and a way to relay scientific ideas. Thus, scientists use films to highlight to the American audience the need to study and fund scientific research. However, the lack of pictorial depiction of a specific field of study, such as underwater exploration, may correlate with the level of interest and inclination of the exploration of the subject. Therefore, this study focuses on the analysis of the influence of film on the American audience and the depiction of undersea exploration in *The Abyss(1989)* as compared to the depiction of outer space exploration in the film *2001:A Space Odyssey (1968)*. Since the beginning of the space race in 1957, depiction of undersea exploration in well-known films is minimal in comparison to the depiction of outer space exploration. Often, outer space exploration is portrayed in a more positive manner by reflecting the premise of the American frontier in its films. Contradictory, undersea exploration is generally portrayed negatively, depicting the image of mankind going into the darkest part of the ocean, often to recover something that was lost. In essence, by using positive pictorial images to spark the American publics' interest in undersea exploration, the level of exploration could increase and lead to the discovery of alternative resources in a more familiar ocean than an unfamiliar outer space.

48. Internalized Homophobia in Adolescents in the United States: A Case for Implementing Student-Made LGBT Programs to Reduce Suicidal Ideations

Beau Coggsdale, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

GSAs, Gay-Straight Alliances, influence the heterosexist environment within a school system, especially rural schools. The data was collected from various journals documenting suicide rates and levels of self-esteem in rural environments. A lot of the data was collected was cross-referenced because of the lack of research into LGBT youth in rural environments. Much of the research that was conducted was focused on ameliorating internalized homophobia of urban LGBT youth instead of rural LGBT youth, so research into LGBT urban youth was applied to those in a rural environment. Heterosexism exists in school systems because of the lack of support for LGBT students in high school. Heterosexism is very damaging to the mental health of LGBT adolescents because it establishes homosexuality as being outside the norm, which leads to internalized homophobia. Harassment linked to adolescents' perceived or actual sexual orientation can lead to anxiety, decreased self-esteem, lack of academic interest, a feeling of isolation, depression, and suicidal ideation. The aforementioned consequences of harassment often lead into adulthood. Also, there is a negative correlation between schools with an active GSA and the harassment experienced by the student. As the level of activity in the GSA increases, the amount of harassment decreases. The heterosexism results in students attempting to conform to heterosexual expectations, which results in students covering their actual sexual orientation and their gender identity.

49. Post-Work Experiences Predict Sleep Quality in Part-Time Working Students

Authors (* = undergraduate student, † = graduate student): *Beachy, K.*, Moore, C.*, Smith, M.*, Calderwood, C., Gabriel, A.S., & Bennett, A.A†. Department of Psychology*

Adequate sleep quality is essential to student health, well-being and academic performance. However, sleep quality is sometimes jeopardized by activities that students engage in outside of the school settings, such as part-time employment. We sought to explore if post-work experiences that contribute to recovery from work stress are predictive of the sleep quality of part-time working students. A total of 521 undergraduate students working at least 20 hours per week completed an online survey measuring their post-work experiences and sleep quality. Results of a multiple regression analysis indicated that a set of four post-work experiences (psychological detachment, relaxation, mastery, and control over leisure time) were predictive of self-reported sleep quality. Completion of more mastery experiences and greater control over choosing post-work activities were both statistically significant predictors of higher sleep quality.

50. Exploring the Relationship Between Mindfulness and Biobehavioral Factors Associated with Cardiovascular Disease in Women

Susan Ghodrat, Community Engaged and Translational Research Summer Fellow, with Dr. Jo Lynne Robins, VCU School of Nursing

Purpose: This study examined the relationship between mindfulness and specific biobehavioral factors associated with increased cardiovascular disease risk in women. **Design:** A secondary data analysis was conducted on baseline data collected in a larger study examining the effects of tai chi on cardiovascular disease risk in women. **Subjects:** 96 women aged 35-50 years with increased waist circumference and a family history of cardiovascular disease. **Measures:** Biological measures included: fasting glucose, insulin and lipids, as well as C-reactive protein and cytokines. Behavioral measures included: mindfulness, fatigue, perceived stress, depressive symptoms, social support, self-compassion and spiritual thoughts and behaviors. **Results:** Mindfulness was significantly correlated with perceived stress and depressive symptoms. **Conclusion:** Though mindfulness was not significantly correlated with the biological factors measured, it was significantly associated with several behavioral factors and may therefore provide opportunities for clinical practice and future research examining the role of mindfulness practice to decrease perceived stress and depressive symptoms and ultimately decrease cardiovascular disease risk in women. **Key Words:** Mindfulness; Perceived stress; Depression; Biobehavioral; Women's health

51. Body Image Perception: Adolescent Boys and Avatar Bodily Depiction in Video Games

Usha Raman, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Of the little research that has been done on mass media's impact on male body image, only a marginal amount has been focused on adolescent boys. By relating the exposure of adolescent boys to muscular video game avatars to research on the effects of frequent ideal image exposure through other forms of mass media on adult males, it can be determined whether adolescent boys can be influenced by video games to alter their body image. This study considered the impact of regularly viewing ideal images in mass media on males' perceptions of their own bodies, reviewed the body types of male avatars in several popular video games, analyzed the differentiating aspects of video games from other mass media sources, and their specific influence on adolescent boys' body image, and examined the implications of negative body image on the boys' eating and exercise strategies. Although video game avatars have a slightly altered body shape than most male bodies presented in mass media, their unifying trait of being unnaturally muscular resulted in adolescent boys' similar reaction of a more negative body image as adult males' reaction to the common mesomorphic body types in mass media, leading to various psychological and physical disorders.

52. Cocaine and Heroin in Guatemala

Alexander Clark, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Department of Homeland Security and Emergency Preparedness

Cocaine and Heroin has become a major influence in the country of Guatemala. According to C.I.A reports posted on Guatemala, the country possessed enough opium to convert into just under a ton of pure Heroin and this was just in 2005 (it is fairly difficult to get a good report of what the current amount is due to the problem not being a main focus) (www.theodora.com). Many of the country's current issues all stem from this drug problem. This can be seen by observing things such as the high crime rate that the country possesses then breaking down the percentage of these crimes that are drug related. The reason for the prominence of these drugs can be traced back to the state of the country. 54% of its citizens are currently living in poverty and 31% are in debt according to its CIA profile (www.cia.gov). With that many people being impoverished and the allure of the fast money that narcotics can bring it probably seems irresistible to those living in that situation and even looks like the only means of escape. When looking back even further, it becomes apparent that the country has had internal fighting that was fairly recent and is still trying to recover from the conflict. Also they are currently in the midst of a conflict over land involving Belize. Taking these factors into account it becomes a little clearer of why there is a drug problem in the country.

53. Aftermath of the Hobby Lobby Decision: Implications for Women in the Workforce

Hirsh Shah, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Burwell v. Hobby Lobby Stores, Inc. is a landmark Supreme Court case in which it was ruled that the contraceptive mandate from the Affordable Care Act was an unnecessary and substantial burden on Hobby Lobby's corporate exercise of religious freedom. This is the latest of many court cases that have expanded corporation's rights to equal those of humans, giving them individual status without the responsibilities that come along with it. By citing religious

liberty rights, closely held corporations such as Hobby Lobby can impose their religious viewpoints on their employees, specifically by not providing certain contraceptive care coverage. Other corporations are forcing women to choose between careers and families by imposing certain preventative care guidelines, such as egg-freezing methods among others. In order to determine the future implications of this case, I researched the history of corporate personhood, women and usage of contraceptive care, and gender-based workplace discrimination. My research shows that by not supporting female employees who have different health needs, Hobby Lobby sets up a model for corporations to be discriminatory towards women by portraying the idea of an anti-family and unsupportive workforce environment. In addition, the Hobby Lobby case has broader implications, with increasing corporate power causing economic and political ripples. Solutions can be found outside the US, by looking at European guidelines concerning women preventative services as a template. On the home front, the US Government should stand its on ground on the Affordable Care Act mandate concerning women care, by requiring all corporations to adhere to those rules through mandatory legislation, and the American Medical Community should properly inform physicians and patients of all contraceptive options, including Long-acting reversible contraception. This will allow women to be rightfully given access to the full range of preventative care services and a supportive and nurturing environment, and will also keep corporate power in check, preventing future possible cases of workplace discrimination.

54. Language Development in Multiples: Analyzing How Maternal Sensitivity Affects Multiple's Language Acquisition

Madhuri Prayaga, Dept. of Chemistry, with Prof. Mary Boyes, VCU Honors College

The purpose of this study was to examine language acquisition and development in multiple birth children compared to singleton children in order to examine how decreased maternal sensitivity amongst mothers of multiple compared to mothers of singletons affects language acquisition skills in children.. The first phase of research for this study started with research on maternal sensitivity, specifically differing levels of it amongst mothers of different types of children, either by singletons of multiples, and potential causes for these differing levels of maternal sensitivity. The second phase focused on language skills of multiple and singletons at a young age and comparing them together. The third phase looked at exactly how maternal sensitivity could affect language development and correlations between the two. The final phase detailed implications for the results found. The results of the study revealed that there are significant correlations between maternal sensitivity and language acquisition. Maternal sensitivity is markedly decreased in mothers of multiples due to stress of raising multiple and the overall inability to give as much time to each child in a multiple as a mother of a singleton would be able to which researchers have seen to lead to language delays amongst children of a multiple. By identifying that decreased maternal sensitivity is inevitable amongst mothers of multiples and the important of it to language development, we can find more ways to support the mothers to overcome some of the stress and create special language programs for multiple to overcome any early language acquisition delays to aid their transition in grade school.

55. The Complex Relationship between Native Americans and the Hipster Subculture: Cultural Appropriation of the Plains Native American Headdress in the 21st Century by Middle-to-Upper Class American Non-Indians of the Hipster Subculture

Marisa Wood, Dept. of International Relations, with Prof. Mary Boyes, VCU Honors College

My research addresses the cultural appropriation of the Plains' Native American headdress by middle to upper class American non-Indians belonging to the *hipster subculture*. The *hipster subculture* appropriates minority cultures while also receiving the benefits of the majority culture to which they belong. The *hipster subculture* is influenced by a generally limited knowledge of Native American culture and the trends pressed by corporations. Native Americans also contribute to stereotype continuation in order to make money. I reviewed six journal articles addressing culture appropriation in fashion, spirituality and stereotypes as well as six journal articles addressing the relationship between identity and appropriation; three journal articles addressing the *hipster subculture* and their reputation for appropriation, and three addressing the Native American's place in the market. Because hipsters notably lack pride in their own culture, the subculture selectively appropriates pieces of Native American culture. With these conclusions, the *hipster subculture* will gain consciousness of their actions and take more caution in their appropriation habits.

56. Dancing to Win: The Transition of Irish Step Dance from Cultural Art Form to Aesthetic Sport

Morgan Senter, Dept. of Exercise Science, with Prof. Mary Boyes, VCU Honors College

Art has been placed into competitive contexts with mixed results. Although competition motivates artists to challenge their abilities, art created purely for the purpose of winning has the potential to degrade the creative variation and expression of the art form. Competitive dance presents an interesting situation, bordering on the line between performing art and aesthetic sport. Irish dance, in particular, is a unique example of competitive dance culture. As a result of the transition from cultural expressive art form to international competitive phenomenon, attitudes towards Irish dance philosophy have evolved since the introduction of the first competitive dance organization, An Coimisiún Le Rincí Gaelacha in 1930. Historically a cultural and social dance form, Irish dance has developed into an aesthetic sport with a set definition of "correct" goals and ideals as determined by an adjudicator. As the practitioners of the form attempt to cater to a growing competitive scene, the artistry and creative variation of Irish dance have diminished as dancers search for a "winning formula". In this process, dancers neglect self-expression in the dance form. However, active learning-based pedagogical methods can be implemented into Irish dance teaching practices, encouraging younger generations of dancers to expand upon the current competitive mindset. Learning environments where dancers learn by experimentation as opposed to replication instruct the dancer as an artist, opening new avenues for self-expression. Competition may be a significant component of modern Irish dance culture, but by implementing active learning exercises into Irish dance pedagogy, Irish dance teachers can encourage creativity while improving technical skill required for competition.

57. Investigating cultural influences on behavior and psychological processes through proverbs

Cindy Nguyen, Dept. of Psychology, with Dr. Vivian Dzokoto, Dept. of African American Studies

Proverbs are a valuable part of African culture. They transmit messages of shared, communal values inter-generationally. The present study investigates how West African proverbs influence interpersonal relationships. A total of 609 Akan proverbs that addressed Romantic Relationships, Friendship/Enemyship, Family, and General Relationships were examined using thematic analysis. The main components of advocated values in these four different relationship types as captured in the proverbs were identified. It was determined that Akan romantic relationships tend to lean towards a "work-it-out" approach as opposed to the "soul mate" approach typical of Western romantic relationship norms. Additionally, a theme of the necessity for caution in friendships was prevalent in Akan proverbs on friendship. The concept of interpersonal relationships resulting in enemies was a common theme addressed in the proverbs as well. Overall, this study demonstrates that analyzing cultural artifacts such as proverbs can teach us about cultural rules that define relationships.

58. Using historical vegetation data to assist in tidal freshwater wetland restoration: Former Lake Charles at the VCU Rice Rivers Center

Christopher Gatens, Depts. of Biology and Environmental Studies, with Dr. Edward Crawford, Dept. of Biology

Wetlands have been providing humans with critical natural ecosystem services throughout our time on Earth. Nevertheless, these invaluable ecosystems have been habitually altered as a cost of human progression. Two of the most common alterations to wetlands are hydrologic, in the form of damming, and deforestation. Both occurred along Kimages Creek in Charles City County, VA during the 19th and 20th centuries. In 2010 the Lake Charles dam was partially removed, restoring the creek's tidal communication with the James River. Upon the recession of the body of water, numerous woody stumps were revealed. We studied these stump remnants in an attempt to assess the spatial structure and vegetative community of this forested freshwater tidal wetland before perturbation. We began by obtaining a geospatial coordinate for each stump, and every 10 stumps a cross-sectional wood sample was taken. These samples underwent taxonomic identification as well as aging in the lab. During this ongoing study, over 5,000 stumps have been geo-located and 441 samples have been processed. There were 13 unique genera identified, among which 8 were identified to the species. The most abundant genus of trees was *Fraxinus* spp. with a relative density of 73.24%, and the next most abundant was *Carya* spp. with a relative density of 11.79%. The remaining samples were comprised of small densities of various species. The majority of the samples were of obligate or facultative wetland species (63.1%). We will soon compile the geospatial coordinates onto a GIS map and use the species data to better understand the native community. Recreating the natural historical vegetative community could help guide current restoration efforts in other locations in other mid-Atlantic formally impounded wetlands.

59. Fluorescent biosensors to measure endothelial cell responses to fluid shear stress

Natalie Noll, UROP Summer Research Fellow, Dept. of Biomedical Engineering, with Dr. Daniel Conway, Dept. of Biomedical Engineering

The response of endothelial cells, innermost layer of blood vessels, to blood flow is thought to be critical in the initiation and progression of atherosclerosis. Atherosclerosis in the human body is non-random and is highly correlated to vessel sites which experience oscillatory and reversing blood flow. Endothelial cells (ECs), the inner most cell layer of blood vessels are highly responsive to the drag force from blood flow, known as shear stress. To study EC responses to shear stress I used a parallel plate flow chamber in which I exposed ECs to defined fluid shear stress. Using fluorescence resonance energy transfer (FRET)-based biosensors I examined both how zinc levels change in response to fluid shear stress, as well as the mechanical forces applied onto the nucleus. Previous work by the lab suggested that zinc levels were increased following exposure to 24 hours of fluid shear stress. To better understand these changes I utilized four zinc-FRET sensors specific to zinc levels in the nucleus, Golgi, endoplasmic reticulum, and cytoplasm. Although my control experiments indicated the sensors were working properly, I did not observe consistent changes in zinc levels in any of these four subcellular locations for ECs exposed to 24 hours fluid shear stress as compared to static controls. Next I investigated how fluid shear stress affects forces applied to the nucleus. Our laboratory recently developed a nesprin-2 force sensor that has provided the first direct evidence that the nucleus of a cell is subject to mechanical force. Additionally, the rare advanced aging disease Hutchinson-Gilford Progeria syndrome (HGPS), is associated with rapid onset of atherosclerosis despite the absence of standard risk factors (obesity, high cholesterol, etc). HGPS results from a mutation in lamin A that creates an altered nuclear shape. Therefore I hypothesized that forces on the nucleus are a critical mediator of the EC response to shear stress, and that HGPS cells may have altered mechanotransduction that promotes atherosclerosis. I have shown that HGPS cells grown in static culture have reduced mechanical force on the nucleus. Additionally I have shown that ECs expressing the HGPS mutant lamin A do not respond properly to shear stress. I am currently using the nesprin-2 tension sensor to measure mechanical forces on ECs subjected to shear stress, to determine if more stress is placed on the nucleus when the cell expresses progeria or the HGPS mutant lamin.

60. Synthesis of 3-Methoxymethcathinone and Potential Evaluation of its Effects on the Dopamine and Serotonin Transporters

Brian Kern, Depts. of Chemistry and Biology, with Dr. John Ryan, Dept. of Biology and Dr. Sally Hunnicutt, Dept. of Chemistry

A developing issue of drug abuse has been linked to synthetic cathinone-like compounds. These compounds are just recently being related to drug problems, and there is little literature about their pharmacological effects. Cathinone is a naturally occurring stimulant in the *Khat* shrub and its use can be dated back hundreds of years to Middle Eastern countries.1 Methcathinone (MCAT) is the first synthetic analog of cathinone, and over the years several synthetic analogs of cathinone have been found on the street and

about 15 MCAT analogs are now classified as US schedule 1 drugs.2, 3 Each of the cathinone analogs range in potency and what effects they have on neurological transporters.2 Synthetic cathinone compounds can be grouped into two categories based on their mechanism of action at the biogenic amine transporters: the first being a reuptake inhibitor while the other is a releasing agent. The two ultimately have the same effect by increasing the synaptic concentration of a given neurotransmitter. For example MDPV is the first synthetic cathinone shown to act as a reuptake inhibitor, whereas amphetamine and methcathinone are known to act as releasing agents at the dopamine transporter.1, 2 Some of the MCAT analogs, such as methedrone (4-methoxymethcathinone) (**1**; Figure 1), are known to be releasing agents at the dopamine and serotonin transporters (DAT and SERT respectively with greater selectivity for SERT).2 Another analog, 4-chloromethcathinone has also been found to be a releaser at SERT and DAT.4 The substituents have opposite electronic effects; methoxy is electron donating where as chloro is electron withdrawing, but they have similar biological effects. 3-Chloromethcathinone too has been shown to act as a releaser at DAT (EC50 of 46.8 nM) and SERT (EC50 of 410 nM). 5 The aim of this project was to evaluate the influence of electronics at the 3-position of MCAT by synthesizing 3-methoxymethcathinone (**2**) and studying its neurological effects at DAT and SERT. The project plan included synthesis of 3-ethoxymethcathinone (Figure 1). The synthetic scheme for this compound involved three steps (Figure 2). A Grignard reaction on 3-methoxybenzonitrile (3) in THF solution to produced 3-methoxypropiophenone (4),6 which is then reacted with bromine to produce 2-bromo-3-methoxypropiophenone (5).7 Nucleophilic substitution of bromine with methylamine afforded 3-methoxymethcathinone. Time permitting; the next step in this project is to produce multiple metasubstituted MCAT analogs to better analyze the electronic, lipophilic, and steric interactions at DAT and SERT via Hansch Analysis.

61. Investigating the molecular genetics of alcohol dependence: SWI/SNF chromatin remodeling complex influences AFT development in C. elegans

Makeda Austin, Dept. of Biology, with Dr. Jill Bettinger, Dept. of Pharmacology and Toxicology

Alcohol dependence is a serious health concern with worldwide implications. Previous research indicates that an individual's initial physiological response to alcohol, or the naïve level of response (LR) impacts the risk of developing alcohol dependence. This study investigated the effects the Switch/Sniff (SWI/SNF) chromatin remodeling complex on acute ethanol response phenotypes. SWI/SNF influences transcription by modifying nucleosome position, thus altering gene expression. Using the genetic model, *Caenorhabditis elegans*, we tested one member of the SWI/SNF complex, SWSN-9, and its role in ethanol responses and behavioral effects. We hypothesized that SWSN-9 would influence the development of the LR phenotype, acute functional tolerance (AFT). AFT is a decrease in the intoxicating effects of ethanol during a single continued exposure to a drug, indicative of neural adaptation to ethanol. Utilizing locomotion speed assays we compared AFT development of the wild-type, N2, and the mutant strain, SWSN-9. Relative speed comparisons indicate that absence of the *swsn-9* sequence, when broadly expressed, results in a loss of AFT. Further experiments indicate that *swsn-9* expression in either muscular or neuronal cells was sufficient for AFT development. Experiments are currently being conducted to understand how additional members of the SWI/SNF complex affect AFT in *C. elegans*, to better understand the influential role this transcriptional regulator has on alcohol phenotypes.

Makeda Austin conducted her 2014 EXROP summer research experience with Dr. Michael Rosbash of Brandeis University. She is currently a senior studying biology at Virginia Commonwealth University and will complete her B.S. in Biology in May 2015. In fall 2015, Makeda will apply to health psychology PhD programs.

62. Addressing the challenges of computer literacy among young Haitian adults

Siobhan Gray, UROP Summer Research Fellow, Depts. of Information Systems and Religious Studies, with Dr. Manoj Thomas, Dept. of Information Systems

The objective of the research study was to identify and address challenges of capacity building required to facilitate technological competency among school students, young adults and teachers in Haiti through, a two-phase research plan. The first phase utilizes a citizen centric framework for Information and Communication Technologies for Education (ICTE) capacity development that integrates stakeholder needs, prototype development, capacity building, training, and evaluation. They include a sustainable computing platform, Computer on a Stick (COS), and teacher workstation with Internet in a Box (IIAB). The ICTE solutions are installed at six different sites in the impoverished Central Hinche province. The citizen-centric approach presented in this paper may be utilized to develop ICT solution in other countries that face similar barriers of infrastructure and financial resources. The study is planned in two phases. The research outline framework provides a systematic approach to identify immediate and obvious needs of the users, gather feedback for improvement, and incorporate incremental improvements for the engineering of artifacts. In phase 1 of the study, we adapt the citizen-centric approach for developing locally relevant ICTE capacity. The ICTE artifacts developed in this phase leverages low-cost open source solutions to facilitate the acquisition of basic technology skills and computer literary.

63. Morphological innovation and niche opportunity explain the pattern of species diversification in Solanaceae

Sarah McClanahan, Depts. of Environmental Studies and Biology, with Jingbo Zhang and Dr. Wenheng Zhang, Dept. of Biology

The evolution of floral symmetry in the plant family Solanaceae, with predominantly radially symmetrical flowers, is thought to be associated with shifts in pollinator preferences. It is, however, still unclear how the shifts of floral symmetry and biogeography contribute to the shifts of rate of diversification in the family. In this study, we first used ancestral state reconstruction approaches to reconstruct the evolution of floral symmetry and biogeographical origins of the family. Secondly, we calibrated the phylogenetic tree with fossil records to understand the timeline of floral symmetry evolution and biogeographic events. Thirdly, we used MEDUSA program to examine the shifts of rate diversification in Solanaceae. Our results indicate that the Solanaceae originates in South America around the Upper Cretaceous. The common ancestor of Solanaceae likely possessed zygomorphic flowers and the shift to floral actinomorphy occurred around the Miocene, which is also correlated with the rise of the Andes. We also found one significantly elevated rate of diversification leading to the most diversified actinomorphic clade of the family occurred around the Miocene. Interestingly, the floral zygomorphy in the androecium likely evolved in the common ancestor of the family, which may serve as a precursor to the independent evolution of floral zygomorphy in the corolla in the Solanaceae. This finding suggests that the mechanism underlying the evolution of floral

symmetry may be more complex than originally thought. Our continued work investigates whether the specific ecological circumstances correlates to the shift of the diversification rate, as well as the underlying genetic mechanisms that control the evolution of floral symmetry in Solanaceae.

64. Synovial Mesenchymal Stem Cell Response to Platelet Rich Plasma (PRP) in Knee Osteoarthritis: Proof of Concept Study

Karishma Mehta, Dept. of Biology, with Dr. Lynne Elmore, Dept. of Pathology

Background/Objective: Knee osteoarthritis (KOA) is an age-related degenerative disease causing functional disability and deterioration in the quality of life in as many as 37 million US adults. Current treatments include non-steroidal anti-inflammatory drugs and intra-articular corticosteroid and viscosupplementation injections; however, these standard therapies have many drawbacks. Intra-articular Platelet Rich Plasma (IA PRP) injections are becoming a popular treatment for KOA. While IA PRP injection has been associated with reduced pain in individuals with KOA, the mechanism of action(s) is poorly understood. The goal of this pilot study is to better understand the effects of PRP on synovial mesenchymal stem cells (synMSCs). Study Design: Ten subjects with KOA were recruited at the McGuire VA Medical Center, in accordance with an approved IRB protocol. Study visit 1 included (1) collection of blood and preparation of PRP; (2) aspiration of synovial fluid and seeding of cells in media containing 10% patient-derived PRP for selection by adherence; and (3) IA PRP injection into the same knee from which fluid was drawn. At study visit 2 (7-10 days post PRP), synovial fluid was aspirated from the treated knee and, again, the cell suspension was seeded for adherence. Within 3 days of seeding, adherent cells were lysed and cDNA generated for gene expression comparisons (Qiagen RT² Profiler™ PCR 84 gene MSC Array). Cells from a subset of cases were expanded for immunophenotyping and assessment of tri-lineage mesenchymal differentiation potential. Results: Adherent cells expressed high levels of CD29, CD90, CD73, moderate levels of CD105, and undetectable immunoreactivity for CD31 and CD45. Both histochemical staining and qRT-PCR indicated that adherent cells from study visit 1 and 2 were capable of efficiently differentiating along adipogenic, osteogeneic, and chondrogenic lineages. A comparison of gene expression patterns in synMSCs at baseline vs. post-PRP is currently ongoing. Summary: It is feasible to harvest sufficient numbers of MSCs from minimal synovial fluid for quality control assays and a targeted gene expression analysis. We predict that synMSCs exposed to PRP *in vivo* and maintained minimally in culture will exhibit significant differences in gene expression and that these differences will provide insights into the mechanism of the beneficial actions of PRP for KOA.

65. Post-Synthesis Functionalization of Porous Organic Polymers

Logan Wilder, UROP Summer Research Fellow, Dept. of Chemistry, with Dr. Hani El-Kaderi, Dept. of Chemistry

Porous polymers designed for selective gas capture have been shown to exhibit a wide variety of additional applications. To specialize these polymers for various applications, different functional groups can be added post-synthesis. This method can potentially increase

a polymer's surface area or selectivity towards certain gasses. Two porous polymer classes where included in this research; Benzimidazole linked triptycene based polymers (BILPs) and imine linked covalent organic frameworks (ILCOFs). BILPs and ILCOFs are both nitrogen-rich porous polymers developed by the El-Kaderi laboratory which have been shown to show high selectivity towards CO2. While other studies have attempted to attach NO groups to BILPs with nitric acid, a new process utilizing exposure to epichlorohydrin and carbon dioxide at high temperature and pressure may add different functional groups to the polymer. This research will investigate the effects of exposure to high pressure and high temperature CO2/epichlorohydrin mixes on BILP-6 and ILCOF-1.

66. Role of microglia cells in the activation and breakdown of Axonal Initial Segments in the hippocampus and the neocortex.

Carine Binyam, Dept. of Biology, with Dr. Jeffrey Dupree, Dept. of Anatomy and Neurobiology

The Axon Initial Segment (AIS) is an axonal domain positioned in the initial portion of the axon and is where the action potential is generated and conveyed through the axon to a target tissue or cell. The axon is surrounded by an insulating sheath known as myelin, which facilitates efficient and rapid flow of electrical impulses from one neuron to another. Previous research has demonstrated that in the disease Multiple Sclerosis (MS), the loss of myelin inhibits the propagation of action potentials at least in part due to the disruption of axonal domains known as the nodes of Ranvier. While most axonal injuries associated with MS are thought to be a secondary consequence of demyelination, findings from our lab strongly suggest that disruption of the AIS is targeted for disruption by inflammation that is independent of myelin loss. Using an inflammatory mouse model of MS, we observe AIS disruption that correlates with increased microglial activation and specific microglial-AIS contact. Upon comparing AIS breakdown in the neocortex and the hippocampus, it appeared that microglia were activated in both regions; however, AIS loss was more dramatic in the neocortex compared to the hippocampus. Therefore, we proposed that activated microglia, as assessed by morphologic changes, may exhibit different molecular profiles which in turn result in altered function. To test this hypothesis and to elucidate the role of microglia in the disruption of the AIS, we used real-time quantitative RT-PCR (qPCR) and immunohistochemistry (IHC) to characterize the inflammatory state of microglia in each region. While microglia in both regions express proinflammatory factors, there are differences in expression profiles. qPCR revealed that microglia have increased expression of iNOS and arginase-1 in the neocortex, but TNFα expression was increased in the hippocampus. IHC analysis revealed an increase in reactive microglia and an up-regulation of CD68 in EAE induced animals compared to controls. However no significant difference in CD68 microglial expression was observed between cortex and hippocampus of EAE animals. These differences begin to provide the foundation for our understanding of the differential influences that activated microglial cells have on the CNS in both our mouse model of MS and in MS patients and may assist in the development of appropriate therapies to ameliorate functional loss associated with this devastating disease.

67. Forecasting errors in student media multitasking during homework completion

Brittany Noah and Christopher Baker, Dept. of Psychology, with Dr. Charles Calderwood, J. D. Green, J. A. Joy-Gaba, and J. M. Moloney, Dept. of Psychology

Abstract: Many students report that they multitask with media while doing homework, but we know very little about why they engage in these behaviors, when considering that they are damaging to their homework performance. We conducted a study to explore the nature and accuracy of students' predictions regarding media multitasking during homework completion. Sixty-one participants from an undergraduate psychology class predicted their mood and performance if they were and were not allowed to multitask. Participants then worked on their homework in the lab while providing mood ratings. We also attained student permission to access homework grades. It was found that students predicted they would experience lower negative mood and performance if allowed to media multitask, but overestimated the impact of media multitasking on negative mood.

68. Asthma-Related Anxiety and Quick-Relief Medication Use in Urban Children with Asthma

Sarah Astrab & Robin S. Everhart, Ph.D., Department of Psychology

Funding: Targeted Research Grant, Society of Pediatric Psychology (R. Everhart, PI)

Among children, asthma is the most common chronic illness. Although not curable, asthma is manageable with the use of both daily controller medication and quick relief or rescue medication. Anxiety has been found to increase asthma symptoms in children. Caregivers who are anxious about their child's asthma symptoms may perceive their child's asthma as more severe or doubt their ability to manage their child's asthma, which can result in the misuse of asthma medication. This study focused on the association between asthma-related anxiety and the use of quick-relief asthma medications in a low-income, urban sample in Richmond, Virginia. Child participants range in age from 7 to 12 years old (M=9.5 years, standard deviation (SD) =1.5). Data were collected from 53 families and 89% of the child participants from these families were African American/Black (8% Caucasian/White, 3% mixed/multiracial). Caregivers and children completed questionnaires at an initial baseline visit. Caregivers then completed surveys on a cell phone and measured their child's lung function with an AM2 device for two weeks. We had three main hypotheses: 1) If a parent had high levels of asthma-related anxiety, then their child would have higher levels of asthma-related anxiety 2) If the parent had high levels of asthma-related anxiety, then the parent would provide the child with higher levels of quick relief asthma medications, and 3) If the child had high levels of asthma-related anxiety, then the child would receive a higher number of quick relief puffs. Hypotheses were analyzed while controlling for asthma control. Findings suggested that there was no significant association between parent and child asthma-related anxiety. A significant association was found between parent asthma-related anxiety and number of quick relief puffs such that higher levels of anxiety was associated with more rescue medication. However, this association was not significant when controlling for asthma control. The association between child asthma-related anxiety and number of quick relief puffs was also

not significant. These findings are important to consider when looking at a child with asthma because poor asthma management could be associated with parent asthma-related anxiety. Other studies have suggested that if physicians are made aware of parent and child asthma-related anxiety levels, they could work with the families to determine the most appropriate way to approach asthma management techniques to best fit their specific circumstances. Further, our results suggest the importance of focusing on child anxiety in addition to parent anxiety as children and parents may be reporting different levels of anxiety related to asthma.

69. 3D Printing, Video Game Console Preservation, and an Old Super Nintendo

Tesha Ellis, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Video games, while still a major and active part of our society, have their roots as early as the first computer. One of the first computers was taught how to play chess against a human opponent in order to show that a computer could be given a sense of intelligence. This made it necessary to install software that would allow it to think ahead in terms of potential moves, checkmates, and locking moves. Arguably, it is the first video game console ever created before Pong was conceived. Large-scale video game collections can span as far back to 1980s consoles with companion games. Collectors who maintain the inner hardware, retain the necessary installation plugs, and keep older TV models compatible to the systems can still play them whenever they wish, effectively preserving these artifacts of gaming history. One might argue that private video game collectors have a better idea of how to preserve electronic hardware than museum-taught conservation departments. As these items become older, is become more important to be able to preserve them properly so that they can be showcased one day as a highly influential form of human expression and entertainment. One hundred years from now, it would be a true historical treat to be able to engage in 20th century digital entertainment by showcasing these game consoles in mint condition. Arguably, it would be more educational and enlightening to future generations to be able to physically engage with the electronic artifacts than to simply see them behind glass. How can we make sure that future generations are able to experience and interact with 20th-21st century gaming technology? For my case study, I will research different conversation methods that are and can be applied to gaming consoles. This includes understanding the typical and preservation typical shelf-life of a gaming console. Typical shelf-life would be a gaming system left unattended on a floor, in a box, or on an actual shelf. Preservation-typical shelf life of a gaming system is one that it turned on from time to time, maintained, and cleaned, to name a few preservation methods. I will also investigate conversation methods of Desktop tower-model PC units, as they are also considered potential gaming consoles and consoles have inner hardware similar to desktop and laptop computers. I'll reach out to known video game collectors and enthusiasts to inquiry about their preservation and repair methods. Lastly, I will attempt to 3D print parts of a 1993 Super Nintendo Entertainment System. If gaming consoles and their parts can be successfully 3D scanned, then it may be possible to repair worn down systems, repair or replace game cartridges , duplicate or recreate missing components to gaming systems, or copy whole systems for long-distance research potential. It will also allow for future researcher to better engage with the consoles with their original equipment instead of playing the software games on an emulator.

70. Coping, Resilience and Mental Health of Burn Patients; Implications for the Evans-Haynes Burn Center

Leila Parsa and Megan Sutter, Dept. of Psychology, with Dr. Paul Perrin, Dept. of Psychology

This study examined the affect of coping styles and resilience on the mental health of adult burn patients of the Evans-Haynes Burn Center in MCV Hospital. Coping styles and resilience were robustly associated with patient depression, anxiety, satisfaction with life, and self-esteem. Mental health interventions for burn patients may incorporate resilience and alternative coping strategies. The Evans-Haynes Burn Center can utilize these methods to better accommodate patients and their needs. In 2013, 450,000 people received medical treatment for a burn injury in the U.S. (ABA 2013). Despite the survival rate of 97%, burn patient mental health is often neglected, and reduced mental health can elicit increased sensitivity to physiological complications (ABA, 2013; Van Loey et al., 2003). Positive coping strategies have been associated with reduced post-traumatic stress symptoms (Tedstone et al., 1998) and better quality of life (Willebrand et al., 2001) among burn patients. The current study aims to examine the association between various coping styles and resilience, and mental health in burn patients. One hundred burn patients (69% male; average age = 41.83) were recruited from the Evans-Haynes Burn Center located in the Medical College of Virginia. Each participant fulfilled the following eligibility requirements: (a) had sustained a burn injury; (b) were able to communicate in English; and (c) were at least 18 years of age or older. A self-report survey was given to each participant to assess various coping styles, resilience, depression, anxiety, satisfaction with life (SWL), and self-esteem. A series of four simultaneous multiple regressions found that coping (emotion-focused, problem focused, and dysfunctional) and resilience were significantly associated with burn patient depression [$F(4, 80) = 14.48$, $p < .001$, $R^2 = .42$], anxiety [$F(4, 80) = 21.01$, $p < .001$, $R^2 = .51$], SWL [$F(4, 80) = 14.99$, $p < .001$, $R^2 = .43$], and self-esteem [$F(4, 79) = 7.17$, $p < .001$, $R^2 = .27$]. Within these overall models, dysfunctional coping [$\beta = .304$, $p = .011$; $\beta = .345$, $p = .002$; $\beta = -.516$, $p < .001$] and resilience [$\beta = -.456$, $p < .001$; $\beta = -.436$, $p < .001$; $\beta = .264$, $p = .010$] uniquely accounted for variance in depression, anxiety, and SWL, respectively. Emotion-focused coping [$\beta = .262$, $p = .049$] and resilience [$\beta = .336$, $p = .004$] were also uniquely associated with self-esteem. These findings suggest that coping styles and resilience are robustly associated with the mental health of adult burn patients, particularly due to the influence of emotion-focused coping, dysfunctional coping and resilience. Dysfunctional coping (e.g., avoidance) may increase the risk of mental health problems, while resilience and emotion-focused coping (e.g., acceptance) may protect burn patients against poor mental health. Outpatient rehabilitation for burn patients may incorporate training in resilience and alternative coping strategies and thereby improve patient mental health. The Evans-Haynes Burn Unit can focus efforts on creating support groups or offering counseling services for the patients. Strengthening of coping and resilience skills is essential for both physical and mental healing.

71. Nicotine use patterns among VCU students

Jasmine Saini, Dept. of Biology, with Dr. Danielle Dick, Dept. of Psychiatry, Virginia Institute for Psychiatric and Behavioral Genetics

For some individuals, college can be a high risk time for the development of problems associated with alcohol use and other substances. The purpose of this study is to examine

these initiations and use patterns as they relate to nicotine use among college students 18 years of age and older enrolled in Spit for Science: The VCU Student Survey. The Spit for Science research project evaluates the genetic and environmental factors contribute to substance use and emotional health among college students at VCU. This study uses data from the Spit for Science 2011 cohort (n=2007) to investigate smoking patterns among males and female and how they change over the course of their college careers. Starting with a baseline cigarette use (lifetime) question in their freshman fall survey, we will compare this to participants' sophomore spring and junior spring surveys to assess smoking initiation rates and smoking patterns during college. Initial analyses show that 63% of participants had never had a cigarette by the time of their entry to VCU. This research will shed light on initiation and use patterns at VCU and lay the groundwork for future studies involving prevention and intervention programming.

72. Versatility analysis of gold cluster induced blockade enhancement in nanopore sensing

Grace Cummings, UROP Summer Research Fellow, Dept. of Physics, with Amy Chavis and Dr. Joseph Reiner, Dept. of Physics

The biological nanopore α-hemolysin (αHL) is used in single molecule mass spectrometry (SMMS), a method of chemical analysis that retrieves data on the scale of individual molecules. The pore is inserted into a synthetic cellular membrane, partitioning wells of salt solution and analyte, with an electrical current propagated through the pore. By measuring current blockades resultant of analyte occupying the pore, we can deduce characteristics of the occupying species; namely size and charge. To produce better characteristic measurements, the residence time of the analyte in the pore must be increased. Our enhancement technique consists of inserting gold glutathione clusters in the *cis* side of the pore, and having the analyte enter through the *trans* side. The enhancement was projected to be charge based, occurring because the salt-induced positively charged PEG met the negatively charged gold cluster within the pore and experienced attractive coulombic forces, binding them together within the pore and thereby increasing the residence time. Our research probed the versatility of using negatively charged gold clusters to enhance the residence time, including trials using positively charged PEG diamine, positively charged ploy-l-lysine, various alkali salt solutions, and novel gold clusters. We saw that the enhancement is not present in the poly-l-lysine, but remained through further PEG and PEG diamine trials. Furthermore, we propose a joint charge/mechanical blocking mechanism for the residence time enhancement, due to observed enhancement in LiCl, which should not form the partial positive charge in PEG.

73. The Measurement of Mechanical Tension Applied Across Desmosomes

Sindora Baddam, UROP Summer Research Fellow, Dept. of Biomedical Engineering, with Dr. Daniel Conway

Desmosomes are cell-cell adhesion structures that are linked to the intermediate cytoskeleton. Desmosomes are present clinically in both the heart and skin, two tissues subject to large

mechanical forces, suggesting that these structures experience mechanical forces. Currently it is not known if desmosomes, and by extension intermediate filaments, are subject to mechanical forces. To directly measure mechanical forces across desmosomes in the skin we developed a novel fluorescence resonance energy transfer (FRET) biosensor to measure the mechanical forces across desmoglein 2 and desmoglein 3 and expressed this sensor in human keratinocytes. Initially we performed control experiments to show that the biosensors are structurally and functionally similar to endogenous desmogleins. Next we examined the effects of mechanical stretch on desmosomes. For this experiment we designed a custom cell stretcher that was suitable for live cell imaging of cells under stretch. Unexpectedly we observed that mechanical stretch reduced the force on desmoglein 3, while simultaneously increasing the force on E-cadherin, a cell-cell junction structure connected to actin. This result indicates that desmosomes do experience mechanical tension in resting cells, and that these forces are impacted by application of mechanical forces. We are also currently investigating how myosin contractility affects forces on desmosomes. In conclusion we have developed and validated a force-measurement technique for desmosomes and we show that these structures are subject to dynamic levels of mechanical tension. Future work will investigate how desmosome forces are altered in human skin diseases.

74. Evaluating Participant Pool Quality Across the Academic Semester Via Replication

Calvin Hall, Adam Abdelsalam, Alexis Hingle, Melissa Virtue, Dept. of Psychology, with Dr. Jennifer Joy Gaba

Many psychology programs employ the use of participant pools whereby students in introductory courses volunteer to fulfill partial course credit. The goal of the current study was to determine whether the quality of students' responses vary over an academic semester. Participants from an online sample (N=737) as well as twenty separate participant pools (N=2,696) completed eight computerized tasks. In addition, laboratory participants from the twenty separate pools completed an additional two in-person tasks. These tasks assessed various behaviors from previously established paradigms including stress, conscientiousness and mood. Results indicated that of the effects that replicated, participants' response quality was not a factor. This suggests that students, and thus participants, are just as conscientious at the beginning of the semester as they are at the end.

75. A review of teen dating violence and its relationship with gender and ethnicity

V.A. Reed, S. Prieto Rodriguez, K.M. Levine, M.G. Battiata, E.M. Miller, S. Sirak, with E.A. Goncy, Ph.D, Department of Psychology

Research conducted by O'Keefe (1997) found that females inflicted significantly more dating violence than males, but both genders reported equal responsibility for violence. When ethnicity is accounted for there were more African Americans initiating dating violence than White, Asian American and Latino students. Another study conducted by Temple and Freeman (2011) instead found that there was no difference between dating violence in terms of ethnicity.

Victimization was slightly higher in Non-hispanic Multiracial (14.89%) students but was not significant enough for there to be a difference between ethnicities (Temple & Freeman, 2011). Our proposal is to conduct a literature review using Virginia Commonwealth University library databases, PsycInfo, PsycNet, Science Direct, and Clark-Hill's literature reviews to examine teen dating violence and its relationship with both gender and ethnicity. If we can find from previous research a relationship between the prevalence of teen dating violence as it relates to gender and ethnicity, this could lead to intervention and prevention programs that could be incorporated in school and at home. By looking at gender and ethnicity, we could discover other variables that may have a correlational relationship and help explain reasons why teen dating violence is occurring within a particular gender or ethnic group. We plan to look at all types of research as long as they pertain to adolescents and dating violence for both males and females.

76. Construction of a 3-D In Vitro Lung Model for Drug Delivery and Toxicology Studies

Jasmine Wang & Snehi Shrestha with Mahmoud Moustafa, and Nastassja Lewinski, Ph.D.
Department of Chemical and Life Science Engineering

Aerosolized drug delivery is a part of inhaled drug delivery which uses instruments, such as metered dose inhalers and nebulizers, that disperse solid or liquid drug particles in air or gas into the lung. Due to the drug's direct delivery to the lungs, the method is more efficient, requires lower dose and consists of fewer side-effects compared to systemic delivery[1]. Many *in vivo* and *in vitro* approaches have been undertaken for the study of pulmonary drug delivery of aerosolized particles. This study endeavors to take on a new path for the study of pulmonary drug delivery *in vitro* by creating a 3-D model of lung tissue. The purpose of study is to achieve a closer demonstration of the *in vivo* lung model to get a more accurate representation of the nature of drug interactions with lung cells. The study describes an advancement in culturing of lung cells from a 2-D plane to a 3-D tube. Gwyther et al. presented an approach to rapidly self-assemble cells into 3-D tissue rings using smooth muscle cells for biomechanical analysis[2]. The cells were seeded in annular agarose wells. The cells were shown to aggregate and contract around the center post and eventually form a cohesive tissue ring with the help of non-adhesive characteristic of the agarose wells (towards the cells) [2]. The authors reported to have grown tissue rings using other cells lines, which were not specified [2]. For this study, we hypothesize that applying the same principle reported by Gwyther et al, we could fabricate cell-derived tissue rings using lung cells. The cell lines we chose for this experiment represent alveolar type II (A549) and bronchial (BEA5-2B and Calu-3) epithelial cells. We have successfully replicated the polycarbonate mold template, PDMS negatives and annular agarose wells. The polycarbonate mold template was designed using SolidWorks and it was fabricated by machine milling. Three PDMS negative molds were made using the polycarbonate mold. Agarose wells were then made using the PDMS negative. We have seeded two of the cell lines (A549 and BEAS-2B). The results of the ring culture and tube formation will be presented. For the future work, the tube will be tested with aerosolized nanoparticles for toxicological evaluation.

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77. Effect of Knockdown of PNPase on C. elegans

Amanda Montejano, Department of Biology, with Laura Lambert and Dr. Rita Shiang, Department of Human and Molecular Genetics

A variety of mitochondrial RNA import pathways exist in a range of organisms. Small RNA import into mammalian mitochondria is considered to be critical for replication, transcription, and translation of the mitochondrial genome. PNPase is a protein (gene name *PNPT1*), and mutations in the gene cause rare mitochondrial related disorders with phenotypes that manifest as deafness or dystonia and severe encephalopathy. PNPase can degrade or import RNA transcripts in the mitochondria, and is found in the intermembrane space. Specifically, PNPase regulates the importation of small RNA's including RNase P, MRP (mitochondrial RNA processing) and 5S rRNA by binding to specific hair-pin motifs in the imported RNAs. To model the mitochondrial disorders, a PNPase knockdown *C. elegans* model has been developed and a phenotype of extended lifespan due to mitochondrial dysfunction has been identified. To further study the functional pathways causing this phenotype, mitochondrial polycistronic splicing was studied because PNPase is involved in import of RNase P to the mitochondria, and is responsible for RNA processing of the mitochondrial transcript. The purpose of this study is to determine if the knockdown of PNPase on the RNase P complex ultimately causes accumulation of polycistronic transcripts in the mitochondria. This was tested by comparing the ratio of polycistronic RNA transcripts to total RNA transcripts (spliced and polycistronic) in a knockdown nematode worm *C. elegans* and vector control worms using quantitative real-time PCR. Results showed that there was 66 times more unspliced RNA in the experimental group when compared to the control group. In conclusion, PNPase knockdown in *C. elegans* resulted in a significant increase in the amount of polycistronic transcripts in the mitochondria, supporting our hypothesis. Implications include gaining insight into the role of PNPase in mtRNA processing and its downstream phenotypic effects.

This work was supported by the IMSD Research Training Program.

78. Predictors and Consequences of Alcohol-Induced Blackouts

Clay MacLeod, Dept. of Environmental Studies, Amanda Famiglietti, Dept. of Biology, with Zoe Neale (Clinical Psychology, PhD candidate) and Dr. Danielle Dick Dept. of Psychiatry

Alcohol induced blackouts have been the subject of numerous studies dating back as far as the 1940s (White et al., 2004). However, a majority of the research has focused on middle-age alcoholic males. To further understand the mechanisms of alcohol induced blackouts, including predictors and consequences, college student populations have been used due to the heavy drinking that takes place on most campuses. The objective of this study was to determine the potential predictors of alcohol induced blackouts among college students and whether or not blackouts are associated with increased negative consequences related to alcohol use. Data from Spit for Science: The VCU Student Survey was examined to analyze the potential predictors and consequences of blackouts. The sample consists of first-year college students surveyed in the Fall and Spring of their Freshman year. The results from this study will provide insight on high risk drinking and can be used in prevention and intervention programming at VCU.

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79. Assessment of the Neighborhood Environment and its Association with Preterm Birth

Brittaney Castro, Dept. of Psychology, with Dr. Timothy York, Dept. of Human and Molecular Genetics

Preterm birth is one of the most persistent of health disparities and accounts for five times more African American versus European American infant death. The preterm birth rate in African American is nearly twice as high compared to European Americans. Recent studies have shown that a major contributor to this disparity is accounted for by the greater environmental heterogeneity seen in African American populations. The purpose of this study is to examine how the measured neighborhood environment influences race-specific preterm birth rates by: 1) assessing the degree of neighborhood heterogeneity that exists between self-identified race; 2) estimate the extent these sources influence preterm birth rates and; 3) compare the measured neighborhood environment (Neighborhood Inventory for Environmental Typology (NIfETy)) with a self-assessment of neighborhood quality (Neighborhood Environmental Survey (NES)). This presentation will show results that the NIfETy and NES are highly correlated and predict the occurrence of preterm birth. Additionally, results will provide support for our primary hypothesis that women who score higher in perceiving their neighborhood environment as safe/positive, were less likely have a preterm birth. Finally, I will summarize my practical research experience as part of my PSYC 494 internship recording field data for the NIfETy in an urban setting.

80. How well can we predict efflux by ATP-binding cassette G2?

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It is estimated that there will be about 1.6 million new cases of cancer and half a million cancer deaths in the US during 2015. A majority of deaths can be attributed to resistance to chemotherapy. ATP-binding cassette (ABC) efflux transporters such as ABCG2 are overexpressed in chemotherapy-resistant cancer cells. Anticancer drugs, among other molecules, are prone to efflux by these transporters. It is not clear as of yet, which drugs are prone to efflux. Being able to identify substrate and non-substrate chemotypes is therefore of great interest in drug discovery. Current methods used to detect efflux are low-throughput and only limited compounds can be addressed using them. Hence, experimental identification of efflux substrates is expensive and impractical. Hence, computational analysis of ABCG2 efflux is of interest. Therefore, our goals for this study were: (A) to determine a robust method to discriminate between substrates and non-substrates of ABCG2, and (B) to better understand the role of physico-chemical properties of molecules and how affect efflux. We started by accumulating a large dataset of 289 compounds, comprising 179 substrates and 110 non-substrates for ABCG2. To the best of our knowledge, this is the largest such dataset available

from published literature. This dataset forms the basis for all studies reported herein. We attempted to identify descriptors capable of segregating substrates and non-substrates. These two categories of compounds demonstrated significantly different distributions for descriptors such as Log P, Polar Volume, Atom Count, Radius of Gyration, Binding Energy, Length, and Width. Such differential distribution suggested these descriptors may be used to build mathematical models to fulfil our goals. Linear and non-linear modeling techniques were then used to combine these descriptors together into predictive methods. A statistical learning method that creates non-linear models called Support Vector Machine generated the best predictive models. This model demonstrated >75% accuracy in identifying substrates and non-substrates. Importantly our model suggests mechanistic details of the efflux process; previous reports have suggested that Arg482 in ABCG2 is critical for transport of substrates. In concurrence with experimental studies, we find that substrates bind Arg482 better than non-substrates, and that inclusion of binding free energy is crucial for discrimination between them. Finally, we found that the accumulation of a larger data set would probably assist in developing better models. To conclude, molecular modeling of multidrug efflux pumps is relatively uncharted territory and approaches such as ours can help unravel it significantly.

81. Caregiver-identified areas of importance in caring for children with asthma

Erin-Gray McClenny, Psychology and African American Studies, with Samantha Miadich, MA, Department of Psychology, Robin S. Everhart, PhD, Department of Psychology

Funding: Targeted Research Grant, Society of Pediatric Psychology (R. Everhart, PI)

Objective: There is a growing body of research suggesting the importance of considering how families manage child chronic illnesses in the presence of urban and cultural stressors. The aim of this study was to determine the most important, caregiver-identified factors that impact either caregiver quality of life or child health in low income, urban families that have a child with persistent asthma (7-12 years).

Method: A subset of twenty-five children with asthma (M= 9.68 years, SD= 1.44) and their primary caregivers from a larger study participated in a Strategy Building Session. Of the caregivers, 88% self-identified as African American, 84% identified as the child's biological mother, and the mean age of caregivers was 38.88 year (SD= 8.04). Families completed questionnaires in a baseline session and received training on completing questionnaires daily on a cell phone for two weeks (EMA). After the two weeks, caregivers were randomized to either the EMA feedback group or a control condition and completed a Strategy Building Session. The topic of the Strategy Building Session varied by group: 1) the EMA Feedback group focused on strategies to improve the caregiver's quality of life with respect to the child's asthma, or 2) The Control Feedback group focused on strategies to improve the child's overall health. Twelve participants were randomly assigned to the EMA Feedback group and 13 to the Control Feedback group. In both groups, caregivers picked two areas of most importance to them depending on their respective group and with the assistance of a research assistant, designed strategies for improving these areas.

Results: In the EMA feedback group, caregiver sleep (41.66%), worry about child's asthma (33.34%), and caregiver level of stress (33.34%) were the most caregiver-reported areas of improvement related to caregiver quality of life. In the control feedback group, child nutrition

(84.62%), physical activity (46.16%), and sleep (23.08%) were the most reported child health concerns by the caregiver.

Conclusion: These findings give our team a better picture of the stressors and areas of most importance for low-income, urban caregivers of children with asthma. For instance, intervention strategies focused on improving caregiver sleep, caregiver worry related to childhood asthma, and caregiver stress may lead to improved caregiver quality of life. Our future research will determine whether the strategies developed by the EMA Feedback condition did in fact prompt an increase in caregiver quality of life.

82. The Role of Tension Across Cadherins in the Developing Xenopus Laevis Embryo

Delisa Clay, Dept. of Biology, with Dr. Daniel Conway, Dept. of Biomedical Engineering and Dr. Amanda Dickinson, Dept. of Biology

Cadherins are transmembrane proteins found at cell junctions that regulate cell-cell adhesion. Recently, cadherins have been shown to be subjected to significant myosin-dependent tension. We therefore hypothesize that cadherin mechanical tension may be dynamic during the process of embryonic development. To measure mechanical tension in epithelial cells in the *Xenopus* embryo we utilized existing Förster resonance energy transfer (FRET)-based tension biosensor for E-cadherin. The E-cadherin tension sensor was expressed in the *Xenopus* embryo, localizing to cell-cell contacts. The sensor was readily imaged in skin cells at the surface of the embryo. Confocal images showing FRET from the E-cadherin tension sensor in the embryos revealed an uneven distribution of tension across several skin cells. In parallel with immunohistochemical staining of endogenous E-cadherin, we have also begun to identify changes in E-cadherin localization and junction morphology during development. Expression and localization of E-cadherin was also monitored during embryonic wound healing in *Xenopus*. Our results showed that E-cadherin is accumulated cells were elongated at the leading edge. Similar changes in cellular morphology and protein localization were observed in scratch-wound assays in an MDCK cell line. The data obtained thus far indicates that it will be possible to measure E-cadherin tension in various stages of embryo development. Our findings suggest that tension across E-cadherin has a role in the development of *Xenopus laevis*. For future directions, we plan to correlate the changes seen in E-cadherin and cells during wound healing to various levels of tension across E-cadherin using the FRET-based tension biosensor.

83. How Will You Be Protected? Engineering Controls vs. Personal Protective Equipment (PPE)

Morgan Newbold, Dept. of Chemical Engineering, with Dr. Nastassja Lewinski, Dept. of Chemical and Life Science Engineering

The National Nanotechnology Initiative states that nanomaterials are abundant in their uses around the world that it projects that over 2 million jobs will be available for working with nanomaterials by the year 2020. Just a low and prolonged exposure can influence those who work with nanomaterials and it is up to anyone who is exposed to become aware of the

potential health and effects these nanomaterials can cause. The Occupational Safety and Health Administration has created the hierarchy of controls for exposures to chemical hazards and toxic substances and listed the steps of controls from most to least protective as followed: (1) Elimination/Substitution, (2) Engineering Controls, (3) Administrative and Work Practice Controls, and (4) Personal Protective Equipment (PPE). Of the steps in the hierarchy of controls, most research groups have focused on steps 2 and 4 with published studies evaluating the effectiveness of existing engineering controls and PPE in protecting workers from exposure to nanomaterials. In this work, we analyzed 29 studies to determine which types of engineering controls and PPE have been evaluated to date, which nanomaterials have been investigated and under which types of exposure scenarios (e.g. synthesis, handling). We hypothesize that evaluating the engineering controls would be more effective toward protecting workers because these are higher up on the hierarchy of controls. Based on our analysis, more research has been done on PPE which we believe is due to PPE being directly in contact with those exposed and it is more cost effective to implement compared to Engineering Controls. Only one group has studied the effectiveness of engineering controls such as fume hoods. More research focused on engineering controls is needed to help with increasing the other lines of defense that will not lead to PPE being the last line of defense against nanomaterials.

84. Creation of an Annotated Library on FDA Approved Nanomedicines

Tanin Izadi[1], Marley Hodson[1], Bridget T. McInnes, Ph.D.[2], Nastassja Lewinski, Ph.D.[1], [1]Department of Chemical & Life Science Engineering, [2]Department of Computer Science

Nanomedicine is a type of nanotechnology used in the medical field to limit the dosage amount and target drug delivery to specific cells. Nanomedicines that are approved and used tend to be extremely successful; however despite over a decade of research, only a limited number of nanomedicines have advanced for clinical use. A possible reason for the numerous nanomedicine failures is lack of easily accessible information and research on previous nanomedicines. In this project, we have compiled nanomedicine labeling information from the Drugs@FDA website. We have extracted phrases/sentences from labels relating to keywords on nanomaterial properties and drug profile characteristics. In the future, we plan to incorporate discontinued nanomedicines, nanomedicines on the market, and nanomedicines in different clinical trial phases. By compiling the descriptions and contents of a set of specific nanomedicines, a machine learning program could be developed to comb through literature and automatically identify similar nano related entities. Our research works to provide an easier and quicker method to obtain specific information on approved nanomedicine.

85. But First, Let Me Take a Selfie: Personality and Social Networking Behavior

Alexis Hingle, Calvin Hall, Adam Abdelsalam, Melissa Virtue, Dept. of Psychology, with Dr. Jennifer Joy Gaba

Social networking sites (SNS) like Facebook have become a common way to communicate among family and friends. The goal of the current experiment was to examine whether personality traits could predict the type of information an individual chooses to post on his/her personal page. Specifically, we investigated whether narcissism and self-esteem were related to the number and types of photographs posted to SNS. Participants completed questionnaires to assess personality and were monitored on their personal SNS for 2 weeks to assess behavior. Preliminary results suggest that narcissistic individuals are more likely to post photos than individuals with high self-esteem.

86. Receptor of Advanced Glycation Endproducts (RAGE) is Positively Correlated with Tumor Necrosis Factor-α in Adolescents with Obesity

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Introduction: Obesity in childhood is associated with an increased prevalence of diabetes and other traditional cardiometabolic risk factors, suggesting an epidemic of premature cardiovascular disease among today's youth. Glycotoxins, known as advanced glycation end products (AGE's), activating via the membrane-bound receptors (mRAGE), have been implicated in the pathophysiology of inflammation, (increased tumor necrosis factor- α [TNF- α]), insulin resistance and vascular dysfunction in adults, but the role of RAGE in the early stages of metabolic disorders is unknown. In this study, we assessed relationship of cardiometabolic risk factors, mRNA expression of TNF- α and RAGE in peripheral monocytes in adolescents with obesity. Methods: Thirty three adolescents,11-16 years of age, with body mass index (BMI) Z-score≥2 were admitted following a 12-hour overnight fast for anthropometrics, lipid profile , fasting peripheral blood sample collection, and a 2-hour 75 gm, oral glucose tolerance test (OGTT). Peripheral blood mononuclear cells (PBMNC) positive for CD14 were isolated from blood. Cells were further analyzed by quantitative PCR for mRNA expression of RAGE and TNF-α. Pearson's coefficients were calculated to assess the associations between RAGE mRNA and cardiometabolic risk factors as well as TNF- α mRNA levels. Results: The participants had a mean age of 12.7±1.41 years and BMI-Z score 2.32±0.35 SD with 81 % participants being female; 62 % were Black, 28% Caucasian, 10% were Hispanic. We observed a positive correlation between mRNA levels of RAGE and TNF- α in $CD14^+$ monocytes in blood ($r=0.62$, $p<0.01$). However, we did not observe a correlation of BMI, cholesterol or triglyceride with RAGE mRNA levels. Conclusion: The positive relationship between the monocyte mRNA levels of RAGE and TNF-α suggest involvement of AGE- RAGE axis in obesity-associated inflammation and needs to be further investigated with larger sample size as well as studies in healthy adolescents.

87. Carbon Dioxide Hypersensitivity in Monozygotic Twins Discordant for Major Depression

Uppalapati, S., Hahn, S.E., Anderson, A., Hazlett, L.E., Cornelissen J., Roberson-Nay, R. Virginia Institute for Psychiatric and Behavioral Genetics

Transient anxiety is a healthy response to stress. However, constant anxiety elicits negative responses and threatens an individual's day-to-day living. In the United States, 40 million American adults (ages 18 years or older) are diagnosed with an anxiety disorder ("Anxiety Disorders"). The onset of anxiety disorders excluding specific phobias is often childhood to late adolescence or early adulthood. Though depression is characterized as a low-energy state unlike anxiety, there is a high concordance between anxiety and depression. "Nearly one-half of those diagnosed with depression are also diagnosed with an anxiety disorder" ("Facts and Statistics"). There are three goals of the study: To compare the individual response levels between monozygotic (MZ) twins discordant for major depression during an anxiety-provoking task. To evaluate the relationship between self-report measures and physiological responses in adolescent MZ twins discordant for major depression (one twin is diagnosed with major depression and the other twin is not diagnosed with major depression). To identify how physiological responses vary between MZ twins discordant for major depression during a resting baseline and the 7.5% carbon dioxide (CO2) breathing challenge task. Participants included 9 MZ twin pairs ages 16 to 20 discordant for history of major depression. The questionnaires given to each twin included the World Health Organization Composite International Diagnostic Interview Short Form (CIDI-SF), which included an assessment of major depressive symptoms current and lifetime. Twin pairs completed an anxiety-inducing task and Subjective Units of Distress (SUDS) were taken every two minutes. Heart rate variability and skin conductance were analyzed as well as SUDS rating during the physiological baseline and the CO2 breathing challenge task.

The data will be analyzed using multiple statistical methods including paired samples t-test and correlational models. The results will shed light on the lasting impact of major depression on physiologic and subjective measures during rest and the biological challenge.

88. Effect of levels of integration on perception of self-worth, abilities, and happiness of adolescents with ID, LD, and Asperger's Syndrome

Donna Woodburn, Dept. of Special Education with Prof. Faye Prichard, VCU Honors College

Mildly disabled students with LD, ID, and Asperger's Syndrome in contained school environments are isolated from social interactions necessary for realistic self-perceptions. I studied how different forms of accommodation, ranging from full integration to contained classrooms, influence self-image amongst students with ID, LD, and Asperger's Syndrome. I examined articles concerning self-image and happiness amongst these subject groups. These articles ranged both internationally and by the level of integration the subjects were exhibited to. I analyzed these articles for any correlation between self-worth, happiness, and classroom

environment. The results were mixed and not fully conclusive. Some articles found greater feelings of general self-worth amongst these subject groups than their non-disabled peers, and some found less. A possible cause of this mix is that some experiments compared subject groups by mental age and some by chronological age. As the subject groups tested may possess development effecting symptoms, the correct form of comparison remains unclear. The results showed that among children with Asperger's, aspects of friendship such as betrayal are predictors of loneliness and depression. Studies concerning subjects with LD echoed this struggle in friendship. Results from articles also showed that social support can protect feelings of self-worth in students. Although the results found lower self-concepts in students mainstreamed without accommodations, the results also found that complete containment and accommodation create unrealistic self-perceptions which put students in these classes at risk for poor transition into the integrated post-education world. The results couldn't alone find contained classrooms counter-productive. Research should continue to examine effect of peer/parental/teacher support in collaborative (integrated) classrooms on self-concept to see if it protects the students from negative feelings of self-worth but creates realistic perception of skills. Research also needs to continue to examine whether it is best to compare by mental age or chronological.

89. Affirmation and Meaning Threat: Effects on Social-Cognitive Biases

Goldstein, L., Jimenez, H., van Tongeren, D., Cairo, A., & Green, J.

Can affirming oneself or one's relationships buffer against social biases in response to having one's beliefs threatened? To investigate this question, participants were exposed to a self-affirmation, relational affirmation, or a neutral prime. They then wrote an essay about a cherished belief, and read a fake essay (supposedly) by a partner who criticized participants' beliefs concerning religion or science. Participants were then given (fake) peer feedback criticizing their essay, and in return rated the fake essay and indicated willingness to interact with the partner. Both explicit and implicit willingness to interact with the critical partner were measured, as well affiliation with religious and scientific belief groups. The results discuss the effects of self and relational affirmation condition on social-cognitive biases toward others.

90. Factors that influence individuals' decisions to foster children

Layne Mitchell, UROP Summer Research Fellow, Dept. of Psychology, with Dr. Nao Hagiwara, Dept. of Psychology

The racial disparities in the foster care system in Richmond, VA, which involved leaving children in unsafe homes in order to not have a high percentage of African American children in foster care, were recently uncovered and reported. After learning about such injustice, I became interested in investigating possible reasons why this happened. To do so, I specifically drew upon the social psychology literature of racial bias and designed an experimental study. More specifically, the study was designed to assess the effects of foster parents' explicit and implicit racial attitudes on their perceptions of Black vs. White foster children. In order to recruit foster parents in VA, I developed a partnership with the Division of Family Services of

Virginia Department of Social Services. A study invitation email with a link to an online survey was sent to foster parents who are currently in the Virginia foster care system and also in FACES, a foster/adoptive parent network in Virginia, along with a monthly newsletter to the parents through the Division of Family Services of Virginia Department of Social Services. Unfortunately, this recruitment method resulted in only 1 participant completing the entire study. With this small sample size, we were unable to conduct a meaningful statistical test. However, completing this project enabled me to learn challenges that researchers may face that are unique to community-based participatory research (CBPR). I am better prepared to foresee potential challenges associated with CBPR and to design my research projects to proactively prevent such challenges. In my poster, I will further discuss these challenges and potential solutions.

91. Health Care Team Functioning in a Code Scenario: The Moderating Effects of Team Size

Neha Jadhav, Dept. of Psychogy, with Dr. Deborah Diaz-Granados, VCU School of Medicine

Abstract: A "code scenario" is a situation in which a patient is in cardiopulmonary arrest and requires an interdisciplinary, specialized team of healthcare providers to begin immediate resuscitation efforts. The coordination of these skills in an urgent manner requires overcoming both technical and teamwork challenges among members of the "code team". Approximately 44,000-98,000 deaths in America occur annually due to medical error—however, most of these errors are not from lack of knowledge, but from lack of adaptive, or non-technical, skills such as teamwork and leadership. Simulation-based training is especially significant in preparing prospective code teams by allowing them to learn and assess their leadership/teamwork abilities with no threat to patient safety, and is considered a modern advancement in medical education. Our investigation determines to: (1) observe leadership and team-based behaviors during code simulation videos; (2) investigate if differences exist or occur between small or large teams; and (3) define the distinctions between effective and non-effective leaders. For this, code team training videos were transcribed and coded for team size. From our Organizational Psychology literature review and preliminary coding, we have identified specific adaptive leadership behaviors that will be used to assess performance. Examples include: gathering and sharing information, enforcing team action, managing challenges, monitoring systems and resources, and ensuring team well-being. As the project progresses, we will code for these behaviors and their effectiveness among different team sizes. Findings from this project will inform developmental programs for training healthcare professionals at all levels and across disciplines.

92. The Effect of Blogs on the Diagnoses of Factitious Disorder

Daeun Jeong, Dept. of Psychology, with Prof. Mary Boyes, VCU Honors College

ABSTRACT: Munchausen by Proxy is a mental disorder in which caregivers purposely harm a child for attention and sympathy. Munchausen by Proxy is associated with a typical set of symptoms and patterns of behavior. With the popularity of the Internet, perpetrators have turned to social media such as blogs. This disorder is a serious form of child abuse and can

lead to child mortality and severe forms of child mental/physical disorders. This study uses previous cases of Munchausen by Proxy and Munchausen by Internet in order to learn the typical patterns of online behavior so that Investigators and health practitioners can identify if they are working with someone who suffers from Munchausen Syndrome. The results showed that there were common patterns and symptoms in the blogs of the Munchausen caregivers. Some common patterns that are expected to be found in these blogs are exaggeration or misrepresentation of the symptoms, inconsistencies in the blogger's stories, history of many hospitalizations for the child, inconsistencies of the doctor's diagnosis in relation to what the caregivers record in their blogs, request for donations and charities, escalation in the severity of the child's health, documented attitude toward the health practitioners, and the use of inappropriate or dramatized photos. Investigators and doctors can use the list of patterns in this study to identify caregivers with Munchausen by Proxy and prevent further abuse to the child.

93. Social Support Moderates the Relationship Between Stressful Life Events and Frequency of Alcohol Consumption

Victoria Harrison, Dept. of Biology, with Dr. Danielle Dick and Dr. Amy Adkins, Dept. of Psychiatry, Virginia Institute for Psychiatric and Behavioral Genetics

Background (1-2): Research has shown that African-Americans respond to traumatic life experiences with a higher frequency of dissociation than other racial groups, which can lead to negative psychological outcomes. Stressful life events have also been shown to increase alcohol abuse in adults. The goal of the current study was to determine whether African-American college students increase their frequency of alcohol consumption in response to an increase in stressful life events, and if social support would moderate this relationship. **Sample (1):** The sample consisted of 1464 African-American students from the Spit for Science Freshman Spring Follow Up Cohorts 2011-2013. **Analysis (1):** Students were assessed on their levels of social support, number of stressful life events, and the frequency of their alcohol consumption. A series of regressions were run to test whether social support moderates the relationship between stressful life events and increased alcohol use frequency. **Results (1-2):** It was found that an increased number of stressful life events was associated with an increase in the frequency of alcohol consumption. It was also found that an increased amount of social support was associated with an increase in the frequency of alcohol consumption in those reporting a higher number of stressful life events. **Concluding Sentence (1):** This information could be used to enhance social support programming here at VCU, and would also add to the literature on African Americans responses to stressful life situations, and the factors that can prevent substance abuse outcomes in that population.

94. An Evolutionary Perspective on the Persistence of Early-Onset Alzheimer's Disease

Samantha Parrotte, Dept. of Anthropology, with Prof. Bonnie Boaz, VCU University College

As the human lifespan increases, the chronic diseases people succumb to are ever present. Diseases that our ancestors died from were acute, but now chronic diseases are diminishing the elderly's quality of life. Alzheimer's Disease (AD) is particularly debilitating and life-changing for its sufferers and their families. While most cases occur during senescence, Early-Onset Alzheimer's Disease (EOAD) can impact individuals who are on the border of their

late reproductive ages and their post-reproductive stage. While the causes of AD are still being researched, it is possible to evaluate the disease from an evolutionary medicine perspective. Researchers generally seem to agree that AD is not caused by a single genetic factor, and the combination of factors for each type may be different. Applying the concepts of evolution and epidemiological transitions, researchers can begin to uncover why these debilitating genetic factors persist. An interesting argument that has been made is the "Mitochondrial Bottleneck Hypothesis," which suggests that a dysfunction or mutation of the mitochondrial DNA serves as the common instigator of the symptoms of all types of AD. In addition, the CATCH Hypothesis suggests that decreased glucose transport to the brain over long periods of time may be implicated in AD. The risk of developing the disease may be intensified by genetic predispositions in combination with a discordant lifestyle. These hypotheses, if supported by further research, could have serious implications on how the health system views and treats AD. Exploring our ancestors' history and understanding them may be instrumental in advancing medicine and health knowledge.

95. The effect of social support on the relationship between stress and alcohol use in Asian Americans

Ekta Patel, Depts. of Biology and Psychology, with Dr. Danielle Dick, Dept. of Psychiatry, Virginia Institute for Psychiatric and Behavioral Genetics

Previous research studies involving Asian Americans found that the stress from acculturation after moving to America, including discrimination, is associated with alcohol use, while Asian Americans who have adapted to the new culture also show increased levels of alcohol use. In these cases, social support seemed to moderate conflict and stress (Park, 2010). Another study deducted that Asian Americans were less likely to have a dissociative experience after suffering a traumatic event, possibly due to traditional collectivist Asian American societies from which an individual would be less likely to withdraw themselves (Anglin et al, 2015). Therefore, we want to examine the association between social support, stress and alcohol use in Asian Americans. In this study, we used self-report questionnaire data from the Spit for Science: The VCU Student Study completed by 1,223 undergraduate Asian Americans from the 2011, 2012, and 2013 cohorts. The Spit for Science research project is trying to understand how genetic and environmental factors converge in different individuals to contribute to alcohol and drug use, as well as emotional health. All measures were taken from the Spring survey of the participant's freshman year. Stressful events were assessed using 12 items to learn whether the participant dealt with a stressful event since entering VCU. Three items were used to assess the extent to which students believed that someone was available to provide good advice, to relax with, or to confide in. Participants were also asked how often they had an alcoholic drink in the past 30 days. Results show that there was no interaction between stressful events and social support on alcohol frequency, but that there was a main effect of social support on alcohol frequency. There was also a main effect in that more stressful life events were associated with increased alcohol frequency. In conclusion, this study is useful in finding new coping strategies that can reduce stress levels, as well as alcohol consumption. The information obtained from this study can help students get the help they need to change their lifestyle.

96. Depressed Mood, Anxiety, and Stress in Adolescents and Young Adults with Sickle Cell Disease

Rebekah Roby, UROP Summer Research Fellow, VCU School of Nursing, with Dr. Suzanne Ameringer, Dept. of Family and Community Health Nursing

Background Sickle cell disease (SCD) is a group of autosomal recessive genetic disorders that primarily occurs in African Americans and in people from South and Central America, the Middle East, and Mediterranean. Management of psychological effects of chronic illness has long been recognized to be insufficient. Identifying and defining the occurrences of depressed mood, stress, and anxiety in SCD is the initial step to developing interventions to help this population cope with this severe chronic illness. **Objectives** The aims of this secondary analysis were to describe depressed mood, stress, and anxiety by gender in AYAs with SCD and compare these results to the literature, examine differences between males and females on levels of depressed mood, stress, anxiety, and quality of life, and examine the correlations between depressed mood, stress, and anxiety and quality of life in both males and females. **Discussion** Participants' depression and anxiety scores are consistent with findings of adults with other chronic illnesses. The parent study found significant correlations between depressed mood, stress, anxiety, and quality of life. This analysis found more significant correlations within the female participants and fewer within the males, suggesting the female participant may have been responsible for many of the significant correlations in the parent study.

97. Stand-Up Comedy and Self-Deprecating Humor

Amelia Bell, Dept. of Art Foundation, with Prof. Jessica Gordon, VCU University College

Stand-up comedy has been around for centuries, making people laugh for generations. Through the years the forms and techniques stand-up comedians use have shifted back and forth. Self-deprecation humor is one of these forms of humor, where the comedian pokes fun at his or herself, and it has recently become more incredibly popular in today's society. Stand-up comedians like Louis C.K. have risen to newfound popularity by using self-deprecating humor almost completely in their sets. This paper attempts to answer the question of why audiences respond so positively to stand-up comedians who use self-deprecating humor. It does so by arguing that there are several reasons for this, including how self-deprecation is trending in other aspects of society and how self-deprecating humor rises and falls in popularity but always remain present in American humor. However the audience also feels more comfortable laughing directly at the comedian than at a certain controversial demographic, and although it is the comedian's performance, by using self-deprecating humor, the comedian relinquishes some of his/her authority and power on stage to the audience because the audience has the power to decide whether to participate by laughing.

98. The molecular mechanism of gain-of-function mutant p53 in lung cancer

Isabella Pearsall, Dept. of Chemistry, with Dr. Sumitra Deb, Dept. of Biochemistry and Molecular Biology

Abstract: p53 is a well-known tumor suppressor protein; however, it is mutated in approximately 50% of all cancers. Oncogenic gain-of-function (GOF) p53 mutants induce gene expression independent of wild-type p53's transactivation capacity. Using H1299 cells expressing p53-R273H we demonstrate that mutant p53 up-regulates epidermal growth factor receptor (EGFR) expression. Knock-down of p53 in H1975 (p53-R273H) lung cancer cells causes lowering of EGFR levels confirming EGFR as a mutant p53 target; human lung tumors expressing mutant p53 also show higher EGFR levels. Knock-down of p53 and EGFR in H1975 cells lowers tumorigenicity, growth and migration which can be compensated by EGFR overexpression, suggesting that EGFR is in the GOF p53 pathway. Chromatin immunoprecipitation (ChIP) assays show p53-R273H binds to the EGFR promoter and increases H3 histone acetylation; indicating a mechanism where mutant p53 induces histone acetylation to enhance chromatin opening for improving access to transcription factors increasing transcription. ChIP and ChIP-re-ChIP studies show docking of GOF p53 on Sp1 and increased binding of Sp1 and CBP on the EGFR promoter. Using a transactivation domain (TAD) mutant of GOF p53, we show that although TAD mutations cause disruption of mutant p53 interactions at a major binding site, mutant p53 promoter interaction at another site is effective to have significant mutant p53-mediated EGFR transactivation suggesting multiple contacts of TAD with transcription factors.

99. Analysis of the Chemical Composition of Hypergolic Mixtures Involving Various Glycol Fuel Sources

Monique Jones, Depts. of Forensic Science and Chemistry, with Dr. Christopher Ehrhardt, Dept. of Forensic Science

Hypergolic mixtures involve a chemical reaction between an oxidant and a fuel source. These reactions are self-igniting and can be performed using common household materials. The ease of access to the reactants, and delayed ignition have increased the occurrence of hypergolic mixtures in arson-related crimes and incendiary devices. Currently, few chemical signatures exist to link hypergolic residues to a perpetrator. This makes it difficult to obtain forensically relevant information from evidence during an investigation. One type of hypergolic reaction of interest to forensic laboratories involves combustion between a glycol-based fuel source and potassium permanganate. Past studies have determined that one can distinguish between the oxidant and fuel used in a reaction based upon the composition of the residues or the extent of the reaction. Through more research, individual characteristics of these reactions can be determined. Trace element analysis will allow for the determination of chemical variation between the sources used to carry out reactions. Therefore, we have designed a study to investigate the differences in residues obtained from hypergolic reactions involving varying glycol fuel sources: brake fluid and antifreeze. Elemental profiles of residues were created using Inductively Coupled Plasma-Optical Emission Spectroscopy. Results showed that the metal composition of a residue sample was valuable in distinguishing between possible glycol fuel sources in hypergolic reactions, and that the ratio of oxidant to fuel source had minimal effect on the metal composition. This was most noticeable in tellurium and lead concentrations, both

of which are present in antifreeze samples and absent in brake fluid samples. In the future, this could aid in determining whether certain metals are unique to fuels from different manufacturers. This would allow for the observation of individual characteristics that could link residues to a brand of glycol fuel and therefore a possible perpetrator.

100. Remyelination Promoting Therapies in Multiple Sclerosis: ATX/ENPP2 as a Potential Target

Morgan Senter, Dept. of Exercise Science, with Prof. Mary Boyes, VCU Honors College

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Multiple Sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system (CNS) in which chronic demyelination of axons ultimately leads to neurological disability. Currently there is no cure for MS, and therapeutic interventions are disease-modifying only. One of the major challenges in the field lies in the identification and characterization of molecular mechanisms suitable to enhance myelin repair under the conditions extant in the MS CNS. In the studies presented here, we used the cuprizone model, in which certain aspects of MS pathology are mimicked, to study the direct effect of ATX on oligodendrocytes and the indirect effect of ATX on the functional properties of microglia. ATX is an extracellular protein secreted by oligodendrocytes. ATX has been indicated to directly promote oligodendrocyte differentiation via its enzymatic activity, which generates the lipid signaling molecule lysophosphatidic acid (LPA), and the stimulation of epigenetic changes. To assess the correlation between ATX function and oligodendrocyte differentiation, histone acetylation and oligodendrocyte morphogenesis were analyzed upon inhibition of ATX's enzymatic activity. In addition, ATX has been proposed to possibly promote regeneration-promoting functions of microglia and to thereby support oligodendrocyte differentiation and consequently remyelination. To assess a possible correlation between ATX protein levels and microglia activation state, microglia morphology was analyzed using confocal images of immunostained sections taken from wildtype and ATX knockout mice post cuprizone induced demyelination. Taken together, these experiments provide novel insight into the role of ATX in modulating oligodendrocyte differentiation and remyelination.

101. Beyond the Horizon: The Limitless Potential of Three-Dimensional Technology in Archaeology

Rebecca Bowman, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

My research started during the summer of 2014 with a joint internship at VCU's Virtual Curation Lab and the Virginia Department of Historic Resources under the supervision of Dr. Bernard K. Means and Katherine Ridgway. The purpose of my research was to conduct a comparative study between the virtual and physical process of mending, or repairing, artifacts. I was granted access to three different vessel fragments which were improperly mended in the 1960s. It was my goal to remove the previous adhesive adhered to the sherds and replace it

with a safer adhesive. Simultaneously, I brought the previously mended sherds into the Virtual Curation Laboratory to scan them into the three-dimensional computer software using the NextEngine 3D scanner. I used three-dimensional technology to experiment with different additive and subtractive methods in order to virtually mend the sherds and print out interactive replicas. I continued to take advantage of the interactive potential of three-dimensional technology to connect the public to my findings on a kinetic level. I used 3D technology to print puzzle games of various difficulty in order to allow the public to attempt physical mending themselves and then compare their results to the virtual mends. The first workshop I conducted using the interactive potential of my research received an enormously positive response from the public, whom had previously not shown much interest in my studies. Instead of reading about research, the community was able to learn, hands-on, the same way I learned. This process granted all individuals the ability to draw the same conclusions I drew myself. Three-dimensional technology allows for a deeper comprehension of the research process which makes learning more fun and memorable. Additionally, it evolves the current standards of research presentation methods into a tangible, interactive relationship with the public. With 3D technology not only are more research questions available to answer, but the educational benefits of kinetic learning are also applicable for all ages. With credit to three-dimensional technology, transforming the presentation of my archaeological research from primarily an academic audience to a public audience has expanded the communal comprehension of my findings. This allows for better communication and interaction with those in both academic and non-academic fields and broadens the potential for future use of three-dimensional technology in archaeology.

102. To tell or not to tell: Influences on adolescent secrecy and implications for adjustment

Tracy Kim, Catherine Knox, Dept. of Psychology, with Dr. Wendy Kliewer, Dept. of Psychology

Prior research has identified a positive relationship between secrecy and internalizing symptoms (depression, anxiety, and posttraumatic stress disorder) among adolescents (Frijns, Keijsers, Brange, & Meeus, 2010). Other studies have supported a positive link between exposure to community violence and adolescent secrecy (Dinizulu, Grant, & McIntosh, 2014). Our research integrated these findings, testing them in a longitudinal path model across two waves. The model was tested using data collected from 318 predominantly African American, low income adolescents (M_{age} = 13.13, SD_{age} = 1.52, 53.6% female) in the Richmond, VA area as part of Project COPE. In a model that included both exposure to community violence and adolescent reports of maternal support, only support was prospectively associated with secrecy. That is, controlling for adolescents' age and sex, felt support at baseline was associated with less secrecy one year later. Lower levels of secrecy, in turn, were associated concurrently with lower levels of internalizing problems. These findings contribute to the literature by supporting the salience of the parent – child relationship as it pertains to adolescent mental health.

103. Psychiatric Involuntary Hold Policy in America: A Description of Current State Policies

Evan Peters, UROP Summer Research Fellow, School of Social Work, with Dr. Matthew Bogenschutz, School of Social Work

Psychiatric involuntary holds are initiated when an individual suffering from mental illness is deemed a danger to themselves or others. Each state and the District of Columbia has its own

legislation outlining the process for involuntary holds and the assessments that take place during a hold. A variety of individuals, professional and non-professional, can be involved in the process. Each state also sets a time limit during which a person can be held, and specific language that details the behavior of individuals that are eligible for psychiatric involuntary holds. This information was gathered by examining each states' codes involving psychiatric involuntary hold policy and tallying the number of appearance of certain categories of language. National trends in this important process within the American psychiatric system were recorded and visualized using maps.

104. Examining the Effect of Taxol on Xenous Laevis At Stage 35 - 40

Diana Duong, Dept. of Biology, with Dr. Amanda Dickinson, Dept. of Biology

Orofacial development is the growth of facial features that occur in early stages of embryo development. In mammalian embryos, the face develops from the frontonasal prominence, lateral nose prominences, and the maxillomandibular prominence of the first branchial arch. When the mouth forms, invagination occurs of the ectoderm and then the buccopharyngeal membrane ruptures. Mouth formation requires cell apoptosis, and is affected by signaling pathways, external toxins, and stress. One of the external toxins that can affect mouth formation is medication, such as taxol. Taxol, also known as paclitaxel, is a cancer drug that comes from the bark of Pacific yew trees (known as Taxus brevifolia) and is used to treat breast, lung, and ovarian cancer, as well as Kaposi's sarcoma (NCI). Taxol works by constricting microtubule movement, therefore not allowing cell proliferation. Various concentrations will be tested on *Xenopus laevis* embryos treated with taxol at stage 35 and fixed at stage 42. Morphometric analysis will be done to analyze the effects of the drug on orofacial development.

105. 3-D Replication and Reclamation of the Elgin Marbles

Athena Beskenis, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

Museums frequently display artifacts that represent the cultural heritage of peoples across all time periods and societies. For centuries, the ownership of certain material cultures has been disputed. Efforts by some to repatriate antiquities to their country of origin has generated controversy amongst museums, governments, and archaeologists worldwide. A highly contested collection currently displayed at the British Museum are the Elgin Marbles, which were formerly a part of the Parthenon temple and other buildings of the Acropolis in Athens, Greece. One promising solution would be to return the marbles to Greece and authorize the British Museum to showcase three dimensional (3-D) digital models of the Elgin Marbles. By creating 3-D digital models of artifacts, museums can freely access material cultures and avoid conflict with the governments or states in which the articles were originally located.

106. Beyond the Horizon: The Limitless Potential of Three-Dimensional Technology in Archaeology

Sara Lee, Sabbu Bajimaya, Nikita Amin Brandon Love, Dept. of Biology, with Dr. Danielle Dick, Dept. of Psychiatry, Virginia Institute for Psychiatric and Behavioral Genetics

Introduction: Many young college students participate in Greek life to involve themselves with a group of people similar to themselves and to engage in life on campus. The intent of this research is to measure the relationship between Greek membership and/or involvement and personality. Methods: Data from Spit for Science: the VCU Student Survey will be examined to analyze this relationship. The participants included freshman fall and sophomore spring survey participants from the 2012 Spit for Science cohort. The measures for the study were the Big Five Inventory (BFI) and the UPPS impulsive behavior scales. The BFI includes the personality traits of agreeableness, conscientiousness, extraversion, neuroticism, and openness. The UPPS scales include the domains of lack of perseverance, lack of premeditation, negative urgency, positive urgency, and sensation seeking. Results: Results indicated that individuals who scored higher on traits of extraversion (r = 0.209), sensation seeking (r = 0.108), and conscientiousness (r = 0.098) spent more time involved in fraternity or sorority parties and events. Additionally, individuals who are members of Greek life scored higher on traits of extraversion (r = 0.098) and conscientiousness (r = 0.067), but lower on agreeableness (r = -0.062). Conclusion: We found that personality traits are associated with membership and involvement in Greek organizations. This study provides insight on personality characteristics correlated with the Greek system involvement and highlights areas of research potentially related to previous findings on alcohol consumption in Greek life.

107. The Biology of Fun and Playfulness in Birds: Do They just want to have a good time?

Carley Langley, Dept. of History, with Dr. Jonathan Moore, Dept. of Biology

The intention of this research project is to delve into the ecological study of playfulness and what appears to be fun in a broad range of bird species. (1) Do all birds exhibit playfulness and use fun? And if so, (2) how have these behaviors contributed to their evolutionary success? Past research has already been underway to biological define what constitutes both “fun” and “play” in animal species. In the past the majority of all test subjects have been mammals, however in the past decade (and especially in the past five years) other vertebrate species such as birds are beginning to be observed as well. The research is still in progress but it seems very obvious from studies so far have concluded that various aviary species do in fact exhibit playful behavior and have fun. Recent hypotheses regarding play in birds, how common it is among various species, and what species have yet to be studied will be topics covered in the research.

108. OutPHAGEous Discoveries

Alina Afzal, Nasser Alali, Robert Allison, Rahaf AlQahtani, Demetrius Carter, Erin Cochran, Kaivalya Dandamudi, Jordan Davis, Ryan Duong, Shelby Edling, Samantha Foltz, Sailasya Gundlapudi, Livia Horton, Damien Islek, Deeksha Jain, Monica Jeyasankar, Michael Livingston,

Amanda Luong, Tom Mathew, Andrew Miller, Rachel Miller, Herleen Mokha, Natalia Olszewski, Bharath Peddibhotla, Aarthi Prakash, Lucas Rizkalla, Christopher Rowe, Neha Sehgal, Yash Singh, Morgan Van Driest, Emma Weber, Erik Wolfsohn, Kristen Wade and [1]Allison Johnson

Spring 2015 BNFO 252: Phage Discovery Laboratory II and [1]Center for the Study of Biological Complexity Virginia Commonwealth University, Richmond VA 23284

While these phages may seem small and insignificant, it is important that we continue to sequence and study them. They might not be widely used in the United States but phage therapy has been proven successful where traditional antibiotics, such as penicillin, have failed (Svoboda, 2009). One of the biggest benefits to studying phages is the fact that they could be used for future medical practice to end the "superbug" dilemma that is being caused today with many anti-biotic resistances forming. It would be beneficial to use these amazing organisms for medical purposes because they have the ability to infect specific bacterial cells without harming a human cell, thus debunking any concerns from the public about it infecting the wrong kinds of cells and causing more harm than good. Over the course of the year, our program has discovered 20 bacteriophages infecting *Bacillus thuringiensis* subspecies *Kurstaki*. These phages were purified and tested for their ability to infect and lyse (host range) 16 different strains of Bacillus bacteria. We observed a broad spectrum of host range, with some phages infecting only a few hosts and other phages infecting many host bacteria. Upon compiling the data we sequenced the genomic DNA of 6 novel phages from the fall semester. The genes in each of the genomes were annotated to compare and contrast genome features. We are now completing comparative genomics projects examining both small and large scale genome characteristics. These research projects focus primarily on exploring genome features related to host range (tail fibers and base plate proteins), understanding the unique location of endolysin and holin in these genomes compared to a canonical lytic cassette, examining points of recombination in order to better understand genomic diversity, and analyzing promotor sequences and sigma factor proteins to understand regulation of phage gene expression.

109. How the Materiality of Phylaster Affects the Play's Afterlife

Julian Neuhauser, UROP Summer Research Fellow, Dept. of English, with Dr. Claire M. L. Bourne, Dept. of English

Due to the inherent dialectical relationship between material and culture, the seemingly stable qualities of dramatic "works" in the early modern period were deeply affected by the materiality of those works' texts. What are considered to be the masterpieces of the early modern era were not simply born of authorial genius, but are the result of the flux inherent in both textual and theatrical reproduction. Furthermore, subtle changes in the materiality of early modern dramatic texts have the potential to directly affect the ideological project of said texts. Through this research project, I have examined slightly disparate versions of the play *Phylaster*, all published within the 1620's, and have found evidence that would suggest that the seemingly inert materiality of the text *Phylaster* has some agency over the intangible realm of an audience's or readership's perception of the story *Phylaster.*

110. Middle Child Status as a Moderator of Emotion Regulation in the presence of Exposure to Violence

Catherine Jung, Patricia Lindholm, Brittani Parham, Dept. of Psychology, with Dr. Wendy Kliewer, Dept. of Psychology

Research suggests that birth order influences children's experiences of violence (Green & Griffiths, 2013). Exposure to violence during middle childhood is associated with higher levels of trauma symptoms of depression, anger, anxiety, dissociation and posttraumatic stress than the general population (Moroz, 2005). There also is evidence to support a connection between exposure to violence and subsequent emotion regulation (Kliewer et al., 2004). The present study examined the effects of exposure to violence on emotion regulation, with middle child status (e.g., having both older and younger siblings) as a moderator. We hypothesized that following exposure to violence middle children would have worse emotional regulation than non-middle children. Data used for this research was from Project COPE; a 4-year longitudinal study conducted by the Kliewer Prevention Research Lab regarding risk and protective factors for adolescent adjustment problems in low-income communities. Using multivariate approaches our results found no evidence that middle child status moderated the relationship between exposure to violence and emotion regulation. However, when considering gender, our research indicated that female middle children who were exposed to violence had more emotion dysregulation compared to female non middle children. Future research should explore the possibility of gender responses to puberty as a possible explanation for these findings.

111. N-cadherin is required cell autonomously for the migration of facial branchiomotor neurons

Kathryn Kirchoff, Dept. of Biology and Psychology, with Dr. Sarah Golding, Dept. of Biology

A fundamental feature of brain development involves the extensive migration of neurons from their place of birth to their final position where they assemble into neural circuits that control behavior. Facial branchiomotor (FBM) neuron migration serves as a model system for our understanding of neuronal migration in general. Here, we test whether N-cadherin, a cell adhesion molecule, is required cell autonomously for FBM neuron migration. Given that N-cadherin is expressed ubiquitously in the nervous system, we required an approach to specifically inhibit the function of N-cadherin in FBM neurons without interfering with N-cadherin function in the environment. Here, we describe the creation of four transgenic lines of zebrafish expressing dominant-negative N-cadherin, that lack the extracellular binding motifs, driven by the promoter for the islet1 gene, a marker of cranial motor neurons. Utilizing confocal microscopy to visualize our results, we show that when N-cad function is compromised, FBM neuron migration is blocked to varying degrees based on the ratio of functioning N-cad to dominant-negative (nonfunctioning) N-cad present in the cell membrane. Higher ratios of dominant-negative N-cad to functioning N-cad correlate with increased blockage of migration. Our dominant-negative technique is a novel approach. To ensure that our dominant-negative approach was specific for inhibiting cadh2, we conducted a heat shock experiment to show

that the resulting phenotype of our zebrafish transgenic model resembles the currently accepted N-cadherin knock-out model.

112. Cosmetics Use Negatively Influences the Self-Image of Modern American Women

Alexis George, Dept. of Political Science, with Prof. Jessica Gordon, University College

People have been using cosmetics for thousands of years. In fact, certain forms of makeup such as kohl eyeliner which can still be found and used today, were even once used by the ancient Egyptians. Even today, cosmetics use is extremely widespread, perhaps even more so now than before. After conducting extensive research, I decided to argue that the use of cosmetics has negatively influenced the self-image of modern American women in a research project. I chose to argue this because doing makeup has been an interesting hobby to me for about 4 years now and I thought that arguing against the positive effects of the use of makeup would be more of a challenge for me and something I was interested in learning more about. This research project required me to write a 1,250-1,750 word researched essay in which I had to make an ethical argument about this topic. I also learned various new concepts and ideas which I employed in my writing and other relevant assignments, such as addressing and refuting counter arguments, making a video to visually illustrate my points, and intertwining my personal experiences with makeup with other research.

113. Post Traumatic Stress and Externalizing Behaviors in At Risk Urban Adolescents: A Prospective Study

Kliewer Prevention Research Lab of Virginia Commonwealth University, Jerry L. Mize II, Undergraduate, Psychology; Angela Chung, Undergraduate, Psychology; Minor Criminal Justice; & Lauren Guerra, Undergraduate, Criminal Justice; Minor Psychology. Lena Jaggi, Doctoral Student, Developmental Psychology, Wendy Kliewer, Ph.D., Chair, Psychology.

Adolescents in in urban areas are at a higher risk for experiencing direct victimization as well as witnessing violence directed towards others, which increases the amount of post-traumatic stress (PTS) they face (Joseph, S., Mynard, H., & Mayall, M. 2000). Experiencing Post Traumatic Stress Disorder (PTSD) has been associated with a number of negative externalizing behaviors, such as increased delinquency, drug use and aggressive behavior in adolescents (Dierkhising, C. B., Ko, S. J., Woods-Jaeger, B., Briggs, E. C., Lee, R., & Pynoos, R. S. 2013). This association is especially relevant, as adolescence is a stage where youth are beginning to experiment and form life-long habits to manage life stressors. However, previous research has been limited regarding gender differences in PTS as males and females often have different ways of coping with traumatic events (Stevens, Murphy, & McKnight, 2003). This study closes this gap by investigating the connection between PTS and externalizing behaviors in the form of delinquency, drug use, and aggression in a sample of urban, predominantly African American adolescents. Data for this study comes from the first two waves of Project COPE, a four-year longitudinal study on violence exposure, stress responses and adjustment who were recruited from low SES neighborhoods in Richmond, Virginia. The sample included 166 males

(46.4%) and 192 females (53.6%), all of whom were in grades five or eight and between the ages of nine and sixteen (*M*=12.13, *SD*=1.62) at wave 1 of the study. The participants consisted primarily of African Americans (91%). During annual in home interviews, participants provided assessments of PTS using the Trauma Symptom Checklist for Children (TSCC) scale, and delinquency, aggressive behavior and drug use were assessed using the Problem Behavior Frequency Scales (PBFS). Linear regression analyses were conducted with and without gender as moderator. Results from this sample found no significant relationship between PTS and Delinquency (Beta=.074, $p>.05$) or Drug use (Beta=.035, $p>.05$) one year later. However, a significant relationship was found between PTS and aggressive behavior at year two (Beta=.185, $p<.05$). Interactions with gender revealed that the patterns of association between PTS and aggressive behavior were similar for males and females. Contrary to previous research, our results show no increased risk of drug use or rule-breaking behavior in this sample of adolescents from high violence neighborhoods, for either males or females. It is possible that the effects were short-term in this case rather than lasting. However, the significant relationship of PTS with increased physical aggression for all youth sheds light on possible long-term consequences of PTS and underscores a need to address this specific risk in low SES, urban samples with high prevalence of PTS. The data from our research further adds to the existing consensus suggesting that low SES, urban adolescents, due to unavailable resources, has the possibility of behaviors reemerging as delinquent behaviors.

114. The Concept of Dharma in the Bhagavad Gita: Understanding Dharma Only as a Means for Moksha

Shripadh Chitta, Dept. of Religious Studies, with Prof. Mary Boyes, VCU Honors College

The way of dharma as a singular means for only living a right life is an inadequate appropriation of the teaching of dharma in the Gita, and applied to Hinduism as a whole. A more adequate and complete philosophy for a person practicing the Gita's teachings would be relating the ever-changing way of dharma (duty) to the final goal of liberation (moksha). To understand and discuss this issue, the different aspects of the way of dharma, such as even-mindedness, that Krishna teaches are required for one to be in the state of moksha, will be analyzed. It is imperative to explain how dharma is a means to moksha by explaining several of the facets of the path to dharma. The origin and day to day life progression of the concept of dharma in a person practicing the philosophy will be explored and understood in reference to attaining moksha as the final goal. To do this, the approach will be using the case of Arjuna as the typical person in a situation of existential despair and Krishna's words will be used as the basis for understanding how for Arjuna and a reader of the Bhagavad Gita, a more adequate life philosophy would be using dharma for the sake of attaining liberation from reincarnation or simply put, moksha.

115. Research Opportunities and Public Outreach Through the Virtual Curation Lab

Lucia Aguilar, Depts. of Anthropology and Spanish, with Dr. Bernard Means, Dept. of Anthropology

Through involvement in the Virtual Curation Lab students are able to work closely with artifacts from a variety of places like Jamestown Rediscovery as well as developing a deeper understanding of the artifacts found and how to get the greater public to care about what these artifacts mean. The critical insight from handling and creating replicas of these artifacts is key in creating innovative ways of pursuing public outreach for archaeological sites. The objects being scanned, digitally stored, and replicated in the VCL not only help create new methods of public outreach and education for those interested in archaeology and history, but also offers an opportunity for undergraduate students to hone important future skills in these fields of study. Students are the ones working on all aspect of the lab, from handling artifacts for scanning to editing scans to painting finished replicas to be used in a variety of ways for public outreach. This opens the doors for countless research topics to bloom into new creative projects and potential publication for undergraduate students that choose to get involved with the VCL.

116. Giving, Taking, and Taking Aversion in Dictator Games

William Turfitt, UROP Summer Research Fellow, Dept. of Economics, with Dr. Laura Razzolini, Dept. of Economics

We have conducted lab experiments to compare philanthropic giving in two contexts. The first context is the traditional positive frame in which donors increase the amount given from $0 to their desired level. The second context is a negative frame in which donors decide how much to subtract from a suggested default amount ($20) until they get to their desired level of giving. The results of this project would extend our understanding of charitable giving behavior to help determine if the cold prickle of taking is stronger than the warm glow of giving.

117. The Lacking Christian Support for Female Domestic Abuse Victims

Catherine Daly, VCU School of Arts, with Prof. Bonnie Boaz, University College

Despite the significant female presence in the beginnings of Christianity, the teachings of the Bible and structure of the church based on these teachings have made women's roles to be inherently subservient to that of men. While such a perspective on the equality of women manifests itself in a variety of damaging ways, the misogyny-entrenched practices of the Church are, in present day, dangerous to women. For many years, Christianity has provided men and women alike with a safe space to express their feelings and, in turn, receive holistic healing and invaluable support. However, women in Christian homes seeking spiritual guidance in circumstances of domestic abuse find little to no space in their faith communities for their needs. The church's focus on the Bible's prescribed relationship between husband and wife, which calls for submissiveness of the woman to her husband, creates an environment

that not only silences women and adds roadblocks on their path to healing, but encourages them to remain in potentially life-threatening situations. Rather than being concerned primarily for the woman and her safety, often times church leaders primarily focus on the importance of marriage and less, unfortunately, on the victim and her well-being. Drawing from scholarly research and surveys from Christian domestic abuse victims and church leaders and referencing biblical text, this paper intends to define and explore the ways in which female safety is subordinate to marriage vows and family structure and how Christian values, meant to uphold higher standards for treatment of others, results in continuously dangerous domestic environments for women.

118. Disproportion of Women in General Surgery and Obstetrics-Gynecology Professions

Nidhi Patel, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

An increasingly number of women have been enrolling in U.S. medical schools recently and the field of obstetrics-gynecology has become predominantly female, but the profession of general surgery still remains largely unequal between the two genders. There is an observable pattern of gender inequality in both of these specialties, which is a result of several different factors which affect all women regardless of their profession. I studied how the stark difference in the percentages of female surgeons versus the percentages of female obstetricians-gynecologists compared to men has been created due to the prescribed gender roles of women in society. I looked at articles in medical journals in the two individual specialties for articles dealing with the different factors, such as family, marriage, social trajectories, to existing stereotypes, that could influence a woman to choose a particular medical profession. I found that although more women have been enrolling in general surgery over the last couple of years, there is still a large difference in the number of women in general surgery and those in obstetrics-gynecology, due to certain factors which have not been publicly addressed. The decrease of women in general surgery has paralleled with an increase of women in obstetrics-gynecology in the same time span, due to the social factors that women are often forced to consider before entering a career field. Societal expectations about motherhood are often the main reason why women really venture into long, strenuous, and demanding careers like general surgery. However, there are other influences that women experience that deter them from general surgical training, such as the existing negative perceptions and stereotypes, gender-based discrimination, and the lack of motivation by same-sex mentors. Since there is a need to address the gender inequality in general surgery, actions need to be to be taken. Increasing the number of women in surgical faculty, providing flexibility with maternity leave, and adjusting rigorous residency curriculum are possible steps to help encourage women to pursue the career.

119. Will Dig For Food: Archaeology and Indigenous Diets on the East Coast

Brenna Geraghty, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

In the archaeology of indigenous peoples of North America, a great deal of emphasis is placed on the most tangible and most often found remnants of material culture, such as lithic tools. These can be clues to learning about the less tangible, but arguably most important

aspects of life, specifically what constituted these people's diets. Diet can be reconstructed through the types of tools found at a site, firsthand accounts, bioarchaeological analysis, and ethnobotany. This research will seek to provide awareness of the ways in which archaeological methodology informs our understanding of diet, focusing on the indigenous peoples of the East Coast region.

120. Collective Effects of Alcohol Metabolizing Genes

Sydney Levan, Dept. of General Sciences – Pre- Health, with Dr. Danielle Dick, Karen Chartier, and Dr. Amy Adkins, Virginia Institute for Psychiatric and Behavioral Genetics

Background: In 2002, it was reported by the National Institutes of Health that 60.3% of college aged students (18-22) drank alcohol in the past month of being asked, as compared to 51.9% of those not in college. They also found that 20% of college students met the criteria for at least one alcohol use disorder (AUDs)[1]. Many genes have been linked to an increased risk for AUDs and how individuals with various ethnic backgrounds respond to alcohol. Genes that metabolize alcohol are obvious candidate genes for alcohol-related phenotypes. The purpose of this presentation is to synthesize information about the key genes involved in alcohol metabolism, as documented in the literature. **Methods:** The information about each gene was found through a literature search using databases including PubMed, Google Scholar, and cited references from relevant papers. For database searches, the names of the genes were used as well as terms such as AUDs, alcohol metabolism, and alcohol and aldehyde dehydrogenase. The focus of the presentation will be relevant to college-aged students, but rely on research done in college and adult populations due to a lack of sufficient college-aged gene-based studies in this area. **Results:** Alcohol metabolism genes affect how individuals process and respond to alcohol. The main genes that have been studied are alcohol and aldehyde dehydrogenase genes. Alcohol dehydrogenase genes, like *ADH1B* and *ADH1C*, first metabolize ethanol (alcohol) into the by-product acetaldehyde and acetaldehyde is then metabolized by aldehyde dehydrogenase genes, like *ALDH2*, into the waste product acetate[2]. Many of the adverse effects associated with alcohol consumption are due to the build up of acetaldehyde. Some of these effects include facial blushing, nausea, headaches, and other similar alcohol sensitivity symptoms[3,6]. Acetaldehyde builds up in an individuals body after alcohol consumption if he or she has a super-active isoenzyme from the *ADH1B* and/or *ADH1C* genes and/or a slow *ALDH2* enzyme. Individuals with the super-active alcohol dehydrogenase isoenzyme and slow aldehyde dehydrogenase enzyme are less likely to develop AUDs due to the negative effects from excess acetaldehyde in the body[4,5,6]. However, this also implies that individuals who do not exhibit the described protective phenotype are more likely to endorse increased drinking behaviors and AUDs. Spit for Science: the VCU Student Survey is currently investigating these genes and their association with alcohol consumption and alcohol use disorder symptoms. Due to the diverse nature of the sample, the researchers are able to explore ethnic differences in these alcohol metabolism genes and their effects. **Implications:** In general, the more public knowledge about these genes and research findings, the more at-risk individuals can get help and diagnosis. A better understanding of aggregate effects of alcohol metabolism genes, as well as more information regarding ethnic differences in the distribution of genetic variants which impact alcohol processing, will assist researchers and health professionals working with those at risk for AUDs.

121. Cosmetics Use Negatively Influences the Self-Image of Modern American Women

Kliewer Prevention Research Lab, Authors: Emily Rowland & Lizna Khimani, Dept. of Psychology, with Dr. Wendy Kliewer, Department of Psychology

Which sleep problems are most related to depressive symptoms? **Daytime dysfunction is the most important sleep problem, and sleep latency is the second most important sleep problem that is related to greater depressive symptoms in college students.** *Which sleep problems are most related to anxiety symptoms?* **Daytime dysfunction is the most important sleep problem, overall quality of sleep is the second most important sleep problem, and sleep duration is the third most important sleep problem that is related to greater anxiety symptoms in college students.** Sleep problems, anxiety and depression are common amongst college students. Researchers examined the specific sleep problems correlated with anxiety and depression. These sleep problems included sleep duration, sleep disturbances, sleep latency, daytime dysfunction, habitual sleep efficiency, overall sleep quality, and use of sleep medication. Researchers predicted that daytime dysfunction was the most important sleep problem related to greater anxiety symptoms, followed by overall quality of sleep, and sleep duration. Meanwhile, it was also predicted that daytime dysfunction would be the most important sleep problem and sleep latency the second most important sleep problem related to greater depressive symptoms. The study consisted of 561 undergraduate students (55% White, 69.9% female). Two multiple regression analyses were conducted. The first examined the most pertinent sleep problems related to greater anxiety symptoms in college students. The seven sleep problems described above were simultaneously entered into the model. The overall model showed significantly greater anxiety symptoms, $F(7, 513) = 19.19$, $p < .05$. Together, these sleep problems accounted for 20.7% of the variance in greater anxiety symptoms. Daytime dysfunction due to sleepiness was the most strongly related to greater anxiety symptoms $t(513) = 6.25$, $p < .05$, followed by overall sleep quality, $t(513) = 2.27$, $p < .05$, followed by habitual sleep efficiency, $t(513) = 2.26$, $p < .05$. The second multiple regression analysis was conducted to examine the relationship between sleep problems and depression symptoms. The same sleep problems were simultaneously entered into the model. The overall model showed the sleep problems significantly predicted depressive symptoms, $F(7, 512) = 34.89$, $p < .001$. Together, these sleep problems accounted for 32.3% of the variance in depression symptoms. In order of importance, sleep duration, $t(512) = 2.84$, $p < .05$, sleep disturbances, $t(512) = 3.82$, $p < .001$, daytime dysfunction due to sleepiness, $t(512) = 8.90$, $p < .001$, and overall sleep quality, $t(512) = 2.14$, $p < .05$, were all significantly related to depression symptoms. These findings suggest that for individuals with anxiety or depressive symptoms targeting treatments that focus on daytime dysfunction and overall sleep quality may lead to a reduction in these symptoms. Additionally, specific to anxiety, we should focus on ameliorating habitual sleep efficiency by improving the amount of sleep individuals consistently receive. Conversely, in relation to depressive symptoms, future work should focus on increasing the amount of time people sleep and decreasing how much people awake while they are sleeping.

122. The Societal Effect of More Women in Congress

Zoe Simpkins, Dept. of Art Foundation, with Prof. Bonnie Boaz, University College

While the United States consists of fifty percent women, female representatives only hold nineteen percent of the seats in the 114th Congress. This research will address the current underrepresentation of women in politics which causes inequality in Congress and creates a difficult political environment for women. Furthermore, the research explores the substantive

and descriptive representation of women in politics in order to reveal how a combination of the two will increase women's representation and cause female empowerment throughout society. Research shows that female politicians face more challenges than their male counterparts in being elected and holding credibility in their positions as senators and representatives. Moreover, the stereotypes women face force them to diassociate themselves from other women, thereby limiting them to act within patriarchal boundaries and diminishing their efficiency in representing their constitutents. Research shows that once minorities gain power in a group, in this case women in Congress, they are able to affect change more efficiently. Though the benefits of women occupying a higher percentage in Congress does not necessarily translate to increased women's rights, women are more likely to address women's issues in legislation, and more so when they do not face discrimination and male resistance to women holding positions of power. Ultimately, an increased presence of Congresswomen in government would empower their female constitutents and signal a shift in cultural values.

123. Maternal Employment vs. Stay-at-Home Mothers: Outcomes for Children

Hannah Campbell, Dept. of Elementary Education, with Prof. Bonnie Boaz, University College

For years, women have not received the same rights as men. However, as we enter the 21st century, these rights have become more inclusive to females of the U.S. That being said, this does not dissuade some people from still having hesitant feelings on one of the rights women have: the freedom to work, along with having a family. Some individuals experience these unsure feelings about mothers in the work force as a result of an underlying belief that children will be negatively impacted if the woman had a career. This research is set up to study stay-at-home and employed mothers to discover to what extent the effects of this personal choice has on the kids, positive and negative. Data is collected from scholarly articles and published studies, which show research that is done through observation and distribution of surveys to each member of the family. Findings support the suspicions researchers had that every mother feels self-doubt about the path she has taken, whether choosing to work or not, and has been concerned about whether she has done the best thing for herself and her family; however, she shouldn't have to feel this way, as it was found that, besides cognitive setbacks up until 1st grade, children suffer no negative consequences as a direct result from mothers working.

124. Ketamine: a Brighter Future for Those in Darkness

Matthew Gayhart, Dept. of Physics, with Prof. Bonnie Boaz, University College

Millions of people around the world suffer from Major Depressive Disorder, and many of these people are given drugs to help treat this potentially devastating disease. For many, the first treatment is successful, and if not, certainly the second treatment gives them the relief they so desperately need. Others, however, are not so lucky, people with treatment resistant depression undergo numerous treatments, some of which are more aggressive than others, but still nothing helps alleviate their depression. Recently an older anesthetic, the drug Ketamine, has been making some news as a new depression treatment. This paper will compare Ketamine to the traditional approved methods for treating depression, as well as discuss the next steps in making this drug more widely available. By reviewing scholarship on the subject of

antidepressants, as well as available research on Ketamine, and by interviewing a patient who recently underwent a Ketamine treatment, this research highlights the positive results of Ketamine while acknowledging the setbacks that still currently exist, and advocates for the use of Ketamine as a treatment for depression.

125. History of Holley School

John Borkey and Lynn White, Dept. of Dept. of History, with Dr. Mary Lamb Shelden, University College

The topic for our research project is the history of the Holley School. Established in 1868, by abolitionists Sallie Holley and Caroline Putnam, the school sought to provide educational opportunities for newly freed African Americans in Virginia. The project will focus on the two founders, their relationship with the abolitionist movement, coupled with a concentration of the Holley School, of its historical beginnings and the trials of maintaining the school throughout the present day. This project is imperative in that it documents personal triumph, the great struggle to educate all Americans, black or white, and a communities' resilience to maintain and uphold a testament to their progress as a people.

126. Don't Walk Alone: The effect of the widely accepted behavior of street harassment on women

Sarah Hughes, Dept. of Biology, with Prof. Bonnie Boaz, University College

Women are continuously exposed to street harassment in their daily lives, however this issue lacks the recognition that it deserves as a societal problem. This paper explores to what extent men control public space and the effect that street harassment has on women both psychologically and physically. Data has been collected from scholarly articles as well as published studies. Unfortunately the research finds that society accepts the mistreatment of women through street harassment as a social norm due to the presence of male dominated institutions. Consequently women are forced to alter their behavior in order to accommodate the ideal of a male dominated public space. Women also face a diminished sense of self worth when exposed to continual harassment in public. In order to address the issue of street harassment society needs to develop a vocabulary to describe instances of street harassment in order to shed light on an issue that lacks recognition.

127. Letters from the Holley School Exhibit

Meghan Madden, Dept. of English, with Dr. Mary Lamb Shelden, University College

As a student of Dr. Mary Shelden and a member of English/History 391, I am sharing the class project of proposing an exhibit for Richmond's new Black History Museum. Our exhibit will be centered around the Holley School, its founders Sallie Holley and Caroline Putnam and their letters to Louisa May and Abba Alcott, the story of slave Winnie Beale, and the living people of Lottsburg who are descendants of the original students and on the Board of Trustees of the

Holley School. My contribution to this project is a small series of quotes from the letters of Holley to the Alcotts to be used in aiding the illustration of and transition between segments of the exhibit. I am selecting "snippets" of the letters which contain particularly descriptive narrative, vivid depictions of life at the Holley School, and clarifying comments relating to Holley and Putnam, Abba and Louisa May, and members of the student body. My goal is to create an eloquent thread through the segments of the exhibit, using the words of the letters to do so. Following the exhibit at the Black History museum, the end goal will be to display these products at the Holley Graded School historic site.

128. Spit for Science: The VCU Student Survey - A study determining the relationships between alcohol use problems, traumatic life events, and physical activity.

Danielle Austen, - Biology and Political Science, Udari Liyanage, Yumna Khalid, JaeSeon Roh, Craig T. Luskey – Depts. of Biology and Chemistry with Dr. Danielle Dick, Department of Psychiatry, Virginia Institute of Psychiatric and Behavioral Genetics

Alcohol problems and binge drinking are prevalent in college students and associated with negative consequences such as difficulties with academics, relationships, and physical and mental health. College students who undergo a traumatic life event may be at an increased risk of engaging in problematic alcohol use. The purpose of this study was to determine if physical activity can mitigate alcohol use problems in college students who are affected by a traumatic life event. Nine hundred sixty-six junior VCU students completed self-report surveys as part of the ongoing study *Spit for Science: the VCU Student Survey*. Students reported on their weekly physical activity levels, past-year experience of traumatic events (physical/sexual assault, accident, or natural disaster), frequency of binge drinking, and *DSM-5* alcohol use disorder symptoms. Linear regression was used to determine the relationship between physical activity levels and trauma in predicting alcohol problems. The results supported the hypothesis that trauma does have an effect on alcohol-related problems in students. There was a positive association between the two variables; those students who experienced trauma had a higher number of alcohol use disorder symptoms. However, our results did not support the hypothesis that high physical activity levels would be associated with fewer alcohol problems; furthermore, physical activity did not moderate the effect of trauma. This suggests that a high level of physical activity does not reduce the effects of trauma on risky alcohol use, and also that students may be using alcohol as a coping mechanism after experiencing trauma. These results can help Virginia Commonwealth University target alcohol prevention programs to those students who have experienced traumatic life events. Physical activity was not supported as an effective coping method; other mechanisms, such as social support may be better means of preventing alcohol problems in college students who have experienced traumatic events.

129. Why Females Use Indirect Aggression on One Another

Emily Ryan, Dept. of Communication Arts, with Prof. Bonnie Boaz, University College

Indirect aggression is hostile behavior or attitudes that are masked or disguised in order to not be caught by others. Similar to passive aggression, indirect aggression is the opposite of direct aggression, where conflict is openly displayed and addressed. Research shows that indirect aggression is a widespread strategy women use to succeed and compete with other women.

This type of aggression is almost never seen among men; women use it to bully one another, even women that they consider friends. This tactic has been subconsciously ingrained into female minds starting at a young age, due to the gender stereotype that women should be non confrontational. This research explains how gender rules are detrimental to female's conflict resolution skills, as well as how gender roles have taught women not to be forthright with what they want to say to one another. Indirect aggression harms women's ability to attain and retain long lasting and meaningful friendships with other women. The research altogether looks at indirect aggression as an evolutionary coping tactic to protect sex, the learned non confrontational gender behaviors women are taught, and how the media reinforces stereotypes of women who have passive aggressive attitudes and personalities through movies and print magazines. All this comes together to show how this behavior increases misogyny among women and how that is detrimental to the advancement of gender equality as a whole.

130. Applications of Nostalgia in Expressive Writing

Supriya Patel, Dept. of Biology, with Dr. Sandra Gramling, Dept. of Psychology

A poster presenting research on bereaved undergraduate students at Virginia Commonwealth University. Among those in the United States, a large portion of who have faced death losses are college students. Recently it has been shown that, in a sample of undergraduates, 47% experienced the death of a family member in the previous 24 months (Battle, Todd, & Greer, 2013). The death of a loved one can be a challenging stressor for college students to face. There are few therapeutic interventions that have been evaluated empirically for this population. Some college bereavement support interventions include counseling services and grief workshops. Expressive writing is a recent method being researched to help bereaved students manage grief. Though expressive writing is not yet empirically supported for bereaved individuals, people subjectively often find it meaningful and useful (Lichtenthal & Cruess 2010). Nostalgia, a "sentimental longing for…the past," (Oxford University Press, 2015) is a recently explored construct that might enhance expressive writing as an intervention for bereaved individuals. A recent project at VCU is exploring expressive writing with the induction of nostalgia. Some prompts that include nostalgia in writing exercises will be provided.

131. Elucidating Fibronectin Fibril-Associated Growth Factors in Breast Cancer

Mitchell Meyerhoeffer, Dept. of Biology, with Dr. Lynne Elmore, Ph.D., Department of Pathology, Massey Cancer Center, Virginia Commonwealth University

Background: Experimental data indicate that breast adipose-derived mesenchymal stem cells (bMSCs) promote mammary cancer cell growth and invasion as well as the development of a fibronectin (FN) rich extracellular matrix. FN is overexpressed in many breast cancers, associated with a shortened disease-free survival, and has been implicated in tumor angiogenesis and metastasis. FN contains a growth factor binding site that can bind over 40 soluble growth factors, all with high affinity, many being implicated in carcinogenesis, and numerous being expressed by bMSCs. **Objective:** The goal of this study was to investigate the expression levels and cellular localization of FN and two possible FN binding proteins in human bMSCs and human breast carcinoma cells (*in vitro* and as xenografts*)* as well as in clinical breast specimens. **Methods:** Two candidate FN binding factors were selected based on their putative pro-oncogenic actions and preliminary data: connective tissue growth factor [CTGF]

and latent binding protein 1 [LBP1]. Mammary stromal (bMSCs) and malignant epithelial (HMT-3522 T4-2) cells and tissues were immunolabeled for FN, CTGF, or LBP1 using standard protocols. Masson trichrome histochemical staining was used to assure that breast carcinomas with prominent stroma were represented on the tissue array. **Results:** FN was abundantly expressed in the cytoplasm and as extracellular fibrils in bMSC cultures. LBP1 had a remarkably similar staining pattern as FN in bMSCs *in vitro*. Despite high levels of CTGF mRNA, CTGF protein was barely above background levels in fixed bMSC monolayers. Cultures of T4-2 human breast cancer cells exhibited weak FN immunoreactivity (nuclear > cytoplasmic) but moderate to intense immunostaining for CTGF (nuclear) and LBP1 (nuclear = cytoplasmic). In the xenografts, FN expression was most pronounced in the stroma. Also as observed in cell culture, T4-2 cancer cell xenografts exhibited moderate to intense immunoreactivity for CTGF and LBP1. Of note, there was evidence of CTGF in association with extracellular matrix in the xenografts, prompting us to extend our immunohistochemical analysis to clinical breast cancer specimens (data pending). **Implications:** The data generated from this project will provide insights into how FN may promote breast cancer progression as well as how closely our experimental breast cancer progression model recapitulates the human disease. If FN fibrils tether numerous pro-oncogenic growth factors in the tumor microenvironment, it is possible that blocking FN fibril assembly may impede breast cancer progression independent of the pathways that are misregulated.

132. Influence of Stress on Heart Rate Variability in Monozygotic Twins Discordant for Major Depression

Authors: Kaabi, O., Hahn, S.E., Anderson, A,E., Hazlett, L.E., Roberson-Nay, R.

Background: HRV is the variation in the time between heartbeats. Low HRV (i.e., reduced variation) is often associated with negative affective states like anxiety, stress, and depression as well as poor health outcomes. This study will examine monozygotic twin pairs where one twin has a positive history of major depressive disorder (MDD) and their co-twin does not. This study relies on the powerful methodology of the discordant monozygotic (MZ) twin method, where an identical twin serves as an unequaled control. **Methods**: Study participants include 10 monozygotic twin pairs ages 16-19 (female=50%, M_{age}=16.9) discordant for a history of MDD. Subjects participated in the Trier Social Stress Test (TSST), a public speaking task followed by a mental arithmetic challenge in front of a panel of three confederates. The task consists of a 5-minute anticipatory period, a 10-minute performance period, and a 5-minute recovery period. Heart rate was continuously measured during the anticipatory and the recovery periods. We predict that affected twins (i.e., twin with a positive history of MDD) will exhibit lower HRV during the anticipatory period before the TSST compared to their unaffected co-twin. We also predict that affected twins will exhibit a great decrease in HRV post-TSST. **Results**: As predicted, affected twins exhibited lower HRV in anticipation of the TSST compared to their unaffected co-twin. Moreover, affected twins exhibited a modest decrease in HRV following the stress task while unaffected co-twins did not. We also will examine cortisol reactivity, which will be measured via saliva before and after the TSST. HRV metrics and cortisol reactivity will be correlated to determine their association. **Conclusion:** Our data suggests that young people with a history of MDD experience reduced HRV in anticipation and

following a stress-inducing event. This data indicates that young persons with a history of MDD are at increased risk of poor mental and physical health outcomes.

133. Major Factors Contributing to Human Sex Trafficking in Post-Communist Eastern Europe and What International Law Enforcement Can Do to Minimize the Problem

Jolie Steinert, Dept. of Painting and Printmaking, with Prof. Faye Prichard, VCU Honors College

Hundreds of thousands of women are trafficked for sexual exploitation each year across the globe, where they are abused by their captors and then lost or punished by the legal system. Because of this situation, I set out to discover the major factors contributing to human sex trafficking in post-communist Eastern Europe and how international law enforcement can work together to minimize the problem. In order to answer these questions I studied journal articles about the condition of Eastern Europe after the end of the communist regimes and about the existing gender dynamics and sexism that exists in Eastern Europe. I also examined current international protocol dealing with trafficking and experts' opinions on what should be done next in terms of the law. Although sex trafficking is a complicated issue that is a result of many compounding variables and thus requires equally complex solutions, sex trafficking in post-communist Eastern Europe can be attributed to the unstable political and economic climates of the region as well as extreme gender inequality. In order to minimize sex trafficking, international governments must conduct more research and put preventative measures in place and focus on a victim-centered approach when prosecuting trafficking cases. I will also discuss the need for worldwide governments to amend their trafficking protocol continuously as trafficking is continually evolving.

134. Commercial Banks Sponsoring the Development of a "Micro-credit" Card

Lena Sinanian, Dept. of Political Science, with Dr. Chris Saladino, Dept. of Political Science

This research examines the potential for commercial banks to develop a social credit-card: a rewards card that functions as a gateway for credit-card holders to support grassroots, female-empowering microcredit organizations in developing nations through their rewards points. Microcredit, or commonly known as microfinance, has been widely used as a tool for poverty alleviation since its beginning with Muhammad Yunus' creation of the Grameen Bank in Bangladesh. While microenterprise is not considered the panacea to solving global poverty, many case studies suggest that they provide a culturally-sensitive financial institution for individuals in poverty to launch their own businesses, build credit, open savings accounts, and receive a financial education, health, and empowerment services that are otherwise unavailable to them. Current research suggests that the sustainability and success of microcredit organizations world-wide is inhibited by a lack of initial start-up funding which can be used to supply customers with the financial tools they need to become successful entrepreneurs. This research argues that with the development of a social credit-card, microcredit organizations can receive the initial funding they need to become sustainable while simultaneously benefitting the commercial banks by attracting a customer base of socially-minded individuals who would embrace a convenient tool to help alleviate poverty.

135. Culturally Inclusive Public Health Initiatives

Joseph Mooney, Dept. of Biology, with Dr. Mary L. Shelden, VCU University College

As public health initiatives in the Third-World become increasingly important priorities for the global community, how aid initiatives are structured in the context of non-Western cultures will prove vital to their success and sustainability. A reevaluation of the standards by which Western nations assess the success of aid initiatives within specific cultural mediums must be considered. To reevaluate the success of aid ventures, an understanding of the Neocolonialism and its effect on the aid process, and how biases associated with it adversely affect the cultural autonomy and national sovereignty of people in the developing world must be undertaken. Understanding how these ideas are perpetuated in a post-colonial, globalized world will also prove to be important. Using science and culture, this project seeks to breakdown the processes by which Western biases skew public health initiatives. This project also examines how projects which incorporate non-Western cultural ideals create a more engaged, sustainable, and beneficial aid venture through using local culture to tailor initiatives to specific contexts. Using ethnographic information and understanding of specific cultures, medical and public health professionals can use their scientific knowhow to better improve community health for people in developing parts of the world. Originally conducted for the UNIV 200 Research Project, this project uses an interdisciplinary approach merging perspectives from biology, public health, anthropology, and women's studies to construct meaningful recommendations for future health initiatives to ensure their sustainability and cultural inclusivity.

136. Characterization of Amine Gradients by Colorimetric Analysis

Julie Metzinger, Dept. of Chemisry, with Dr. Maryanne Collinson, Dept. of Chemistry

I currently work with the TLC separation of metal complex mixtures. Under the mentoring of Dr. Collinson at VCU, I create gradient stationary phases using controlled rate infusion. Primary, secondary, and tertiary monoamines are used separately in varying concentrations to determine their gradient profiles. Our objective is to find the method which shows how the concentration changes along the length of the TLC plate. The data I have collected and analyzed will be used in an article being submitted for publishing in April. My portion is detailing on the characterization of the gradient by colorimetric analysis.

137. Gas capture instrumentation. Where can it lead us?

Julie Metzinger, Dept. of Chemisry, with Dr. Rebecca Segal, Dept. of Mathematics and Dr. Hani El-Kaderi, Dept. of Chemistry

I have begun research on making instrumentation for carbon dioxide and methane gas capture. This instrumentation would be used beside highways or near power plant flues in cities with high amounts of pollution around the world. I have been using journal articles to define my procedures and validate adsorption values. Under the mentoring of Dr. El-Kaderi at VCU, I am synthesizing a specific metal organic framework (MOF), made with HKUST-1. Dr. Segal and I are using formulas and various models to optimize the size, widths, and shape of the instrumentation. These structures allow maximizing gas capture on the films, while

keeping the chemicals protected from harmful environmental factors. To be more eco-conscious we chose molecules that will release the gas at low pressure. These thin films could be reused multiple times before discarding. After accumulating a large amount of gas, I would collaborate with industries to convert the captured gas into alcoholic fuels. I hope to spread my idea to encourage anyone (of any age, GPA, and major) to use their creativity to help build more efficient machines for curbing pollution in the atmosphere. The "snow ball" effect if you will.

138. Study on the Dissociative Identity Disorder and Different Forms of Possession in India to Examine the Role Family, Marriage, Religion and Social Norms Play to Shape the Perception and hence affect the Prevalence of Dissociation in Society

Bishakha Dhamala, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

I am studying the instances of Possession in urban societies in India to study why it is a more common form of dissociation than the Dissociative Identity Disorder which shares a lot of similarities with Possession Trance Disorder. The major causes of dissociation, i.e. trauma and sexual abuse, are topics of constant study and analysis as the consequences can be severe. By studying and comparing the effects of trauma in different environment and culture, we can understand how the consequences of trauma can be shaped differently based on different coping mechanisms an individual adopts. And this coping mechanism is directly influenced by the subconscious understanding and perceptions about dissociation and social stigma that is implanted in an individual through the environment they are brought up in. This brings up the question, what kind of cultural factors might shape the perceptions of dissociation and in what ways that an individual's subconscious resorts to it? I have studied and analyzed the prevalence of Possession in rural India, viewpoints of Indian parents whose children are mentally ill, case studies of mentally ill people in rural India, etc. in relevant literature. I found that the major factor is social acceptance and fulfilling the social roles and responsibilities. "Possession" allows victims in rural India are to save their family prestige, eliminate the possibility of a child being considered an unsuitable bride/groom because of his/her mental illness and lets them rationalize their condition based on their religious beliefs.

139. The Influence of Asian Culture on the Increase of Anorexia in Asian Countries.

Kristina Nguyen, Dept. of Chemistry, with Prof. Bonnie Boaz, University College

With the spread of globalization, the Asian populations have experienced an increase in the cases of anorexia. Many are quick to claim that the increasing rates are due to the spread of westernization, though this overlooks the difference in culture between Western developed countries and Asian countries. Currently, anorexic Asians are under-diagnosed because the medical definition is based off of a western model. This research focuses on both Eastern and Western medical studies of anorexia, along with perspectives from Asian females. A combination of the influence of westernization and how Asian culture plays a key role to the predisposition of anorexia contribute to the increasing rates of anorexia in Asian nations. Thus, this research suggests that the medical model of diagnosing and treating anorexia should to be altered to consider the cultural influences. In addition, this research calls for the inclusion of

cultural factors in future research to accurately reflect the population of those who suffer from anorexia. Until the treatment and diagnosis of anorexia takes into account the cultural components of the individual, under-diagnosis of Asians and the perpetuation of the western model will persist.

140. The Creativity Crisis in Public Education

Alexandra Kokulis, Dept. of Art Foundation, with Prof. Bonnie Boaz, University College

Over the last few decades, the public education system in the United States has undergone many reformations. One of the most prominent and recent is the No Child Left Behind Act that pushes for standardization of testing and education goals. This paper examines how standardization of the US public education system is stifling creativity and impacting learning. Through examination of research studies and interviews with teachers, the research shows the public education is creating what some scholars call the "creativity crisis" (Kyung 2011). Standardization pushes schools to raise the passing rates in order to compete against schools in the surrounding area. In interviews, teachers consistently report concerns that students' motivation is to complete work rather than to explore the creation process. Employers recently reported complaints that new hires are not able to think outside the box (Fast Company 2011). This research offers possible solutions, which include personalized learning programs, such as Teach One, and programs focused on creative thinking, such as a program in Vermont called the Integrated Arts Academy.

141. Appreciating How the Most Painful Rites of Passage Create the Manliest of Men

Juan Goncalves-Borrega, Dept. of Anthropology, with Prof. Bonnie Boaz, University College

In one way or another a man's coming of age is celebrated in their society. These rituals are found in all cultures across the globe. A reoccurring theme found in most rites of passage for men is their ability to withstand pain. Men must go through excruciatingly painful ceremonies performed in front of the entire, or just a select fraction of, the village before becoming a man. As the modern age progresses more and more of these ancient traditions are becoming outlawed for their painful practices. However, many contemporary cultures still practice painful rites of passage freely, or illegally. This paper examines research on three cultures today still practicing rites of passage involving pain tolerance and explores the similarities in their rituals. These case studies focus on the Mandan people of North Dakota, the Satere-Mawe tribe of the northern Brazilian Amazon, and gangsters of the American west coast. A cross cultural comparison of these three peoples challenges the reader to appreciate the role of pain in rites of passage and masculinity.

142. Differences in tobacco use behaviors and beliefs among asthmatic and non-asthmatic adolescent cigarette smokers

Makeda Austin, Dept. of Biology, with Megan Sutter, MS, Health Psychology and Dr. Caroline O. Cobb, PhD, Dept. of Psychology

The relationship between adolescent cigarette smoking and asthma diagnosis, is not fully understood. Despite evidence that cigarette smoking exacerbates asthma symptomology, previous studies indicate that adolescents with asthma smoke at similar or higher rates than their non-asthmatic counterparts. The purpose of the current study was to better understand this particularly vulnerable population by comparing the tobacco use behaviors and beliefs of adolescent smokers with and without asthma. The current sample consisted of 665 high school students who completed the 2013 Virginia Youth Tobacco Survey and reported current cigarette smoking. Weighted bivariate comparisons by self-reported lifetime asthma diagnosis indicated significant differences between asthmatic and non-asthmatic smokers for days smoked cigarettes in past month, cigarettes smoked per day, days smoked cigars in past month, and social perceptions of cigarette smoking (all *p*s < 0.03). A higher proportion of smokers with asthma compared to those without reported smoking all 30 days (29.1% vs. 21.9%) and smoking more than 20 cigarettes per day (9.2% vs. 3.5%). Past 30-day cigar smoking demonstrated a similar trend with more than twice the number of asthmatic smokers reporting cigar use all 30 days (14.1% vs. 5.4%). Social perceptions of smokers also differed significantly between groups in which a higher proportion of asthmatic smokers reported the perception that smokers "have more friends" (45.9% vs. 38.0%). No significant differences were observed between asthmatic and non-asthmatic smokers for gender, race, age, age of cigarette smoking initiation, or familial smoking rules at home and in cars. Our findings indicate that cigarette and cigar use behaviors and cigarette smoking beliefs differ between asthmatic and non-asthmatic cigarette smoking youth. Consistent with previous work, asthmatic smokers used tobacco products at a higher frequency than non-asthmatic smokers. In addition, these data suggest that asthmatic smokers perceive smoking more positively in a social context, and that these beliefs about peer perceptions may be more influential than familial rules. Although it is unclear whether frequency of tobacco use is a product or a precursor of asthma diagnosis these observed differences in use patterns and social perceptions have important health implications and are deserving of future study. By further understanding the unique use patterns and belief processes characteristic of adolescent asthmatic smokers this research can support the development of informed strategies for tobacco use prevention programs as well as targeted interventions for asthmatic youth.

143. Acetylation Patterns of Histone H3 in Zebra Fish Embryos

Liya Haile, Dept. of Chemistry, Daniel Mohammadi, Dept. of Forensic Science, with Dr. Robert Tombes, Department of Biology

Eukaryotic gene regulation is influenced by the conformation of histones, which controls the level of transcription. DNA is bound to a histone octamer core, known as a nucleosome, which is made up of (2 H2A, 2 H2B, 2 H3, and 2 H4) histones. Together, DNA and histones comprise chromatin. Chromatin condensation is influenced by modification of histones, which can influence gene expression. PKD2 is a calcium ion channel important for kidney function in humans and in other organisms such as the zebrafish. Calcium released in response to fluid

flow through the kidneys binds to Calmodulin (CaM) and activates CaM-Kinase II, which in turn, is known to influence HDAC4 and HDAC 5, which are both histone deacetylases. When activated, HDAC's remove acetyl units from histones, impacting gene expression. In this study, immunocytochemistry was used to analyze the histone acetylation level and pattern in zebrafish during embryonic development. Embryos in which HDAC5, PKD2, or CaMK-II were suppressed revealed that acetylation increased compared to control embryos, particularly in the zebrafish kidney. Patterns of Histone H3 acetylation were compared to Histone H4 acetylation. The results suggest that PKD2, which is a gene whose mutations have been linked to human polycystic kidney disease may act through CaMK-II and targeted histone acetylation, thus presenting a potentially new therapeutic target for polycystic kidney disease.

144. Integrating Anthropology and Biology: Comparing success rates and learning outcomes across majors when taking Human Evolution

DIEGO A. HERNANDEZ1 , KELSEY D. O'NEILL1,2, BRIAN C. VERRELLI1 and AMY L. RECTOR2 . 1 Department of Biology, Virginia Commonwealth University, 2 Anthropology Department, Virginia Commonwealth University.

A charge to bioanthropological curriculum development is generating learning outcomes for substantially different backgrounds of anthropology and biology majors. A primary concern is how prepared anthropology majors are for biology content; anthropology curriculum does not always require biology prerequisites. As bioanthropological research relies increasingly on genetics/phylogenomics, strong emphasis needs to be put on integrating biological content. The core-level "Human Evolution" course at Virginia Commonwealth University is taught under an anthropology rubric. It is required for anthropology majors, and serves as a lab-based elective for biology majors. The course is divided into four primary units: two covering topics that are also explored in lower-level biology courses (e.g., DNA inheritance), and two focusing on paleoanthropological content (e.g., hominin taxonomy). Here, we compare results of course assessments and final course grades between anthropology and biology majors across five semesters and >200 students to determine whether the two majors performed differently on units with "biology" content vs. "anthropology" content. Preliminary results of a series of statistical tests reveal that overall, anthropology and biology majors are earning comparable final grades in the course. However, when assessment results for units with differing content are contrasted, anthropology and biology majors scored comparably on "biology" content units, while biology majors scored statistically significantly worse on "anthropology" content units. These results might suggest that biology rather than anthropology majors are deficient in an integrated bioanthropological perspective. We recommend that anthropology and biology departments consider introducing integrated curriculum that is interdisciplinary rather than multidisciplinary by design.

145. The combination of PI3K/mTOR inhibitor BEZ235 and doxorubicin does not cause toxicity in rat cardiomyocytes

Samya Dyer, Dept. of Biology, with Dr. Sarah Golding, Dept. of Biology

Pancreatic cancer, despite its low incidence rate, has one of the most devastating mortality rates of any other form of cancer. Doxorubicin (DOX) is a powerful chemotherapy drug that results in the single or double stranded DNA breaks resulting in apoptosis. BEZ235 (BEZ) is an experimental chemotherapy drug that inhibits the PI3K/mTOR pathway, which is usually over-activated in cancer tumors. Sildenafil (Sil) is a potent PDE-5 inhibitor shown to protect against DOX-induced myopathy. The aim of the present study was to determine the potential cardiotoxic effects of combining DOX and BEZ in the H9C2, a rat cardiomyoblast, cell line, and whether or not Sil would protect against those effects. MiaPaca2 pancreatic cancer cells were treated for 48 hours with BEZ and DOX, both alone and in combination, then a western blot analysis was run to measure markers of PI3K/mTOR pathway activity. A Trypan Blue cell death assay was also carried out. Levels of cell death were shown to increase when treatments contained both DOX and BEZ. H9C2 cells were treated for 24 hours with DOX, BEZ, and Sil, alone and in combination, then a western blot analysis was run in order to measure different marker of apoptosis. Instances of cell survival increased when the cells were treated with all three drugs in combination. Athymic nude mice were treated with BEZ every day, and DOX twice, during a 4 week period. Afterwards an echocardiogram was done in order to measure systolic function of the hearts. Both the ejection fraction and fraction shortening of the hearts decreased with the DOX only treatment, while there was a lower reduction of systolic function in the DOX and BEZ combination group. In conclusion, BEZ in combination with DOX enhances the killing of pancreatic cancer cells, while not increasing the cardiotoxic effects of DOX.

146. Empowering youth and Increasing community engagement through permaculture and biophilic design

Ardilla Deneys, Community Engaged Summer Research Fellow, Dept. of Interior Design, with Dr. Susan Bodner-Deren, Dept. of Sociology

Dwight Jones, Richmond's mayor, is proposing a redevelopment of Shockoe Bottom. Considering that this space is one of the most important historical locations of African American history, great care should be taken in who is participating in developing the space. This space is also located in close proximity to some of the city's most impoverished neighborhoods; communities that have been historically overlooked as active participants in the planning and design of policies about public space which directly impact them. As a result, I have proposed a project that will give the community a voice in the planning and use of their public space. To do this, I will be focusing on youth in the community. As proposed in my Undergraduate Research Opportunities Program (UROP) project, I am teaching a permaculture garden design course to underserved African American middle and high school students from schools closest to Shockoe Bottom; working together to develop skills to participate in the redevelopment conversation. However, with such limited experience outside of their housing development and in the outdoors, the students have had little interest in garden design. This fall, the students will be installing their own gardens at home to ignite interest in proposing a garden design to Mayor Jones.

147. "Archaeology: Board Game Edition"

Lauren Hogg, Dept. of Anthropology, with Dr. Bernard Means, Dept. of Anthropology

For this poster I will display an interactive archaeology board game. This game is designed to appeal to a wide range of players using 3-D printed artifacts. The goal for this game is to allow the players to make their own decisions throughout the game that will stimulate an archaeological journey with multiple outcomes for the players. Along with the presentation of this board game I will additionally present information explaining the positive benefits of including a "hands on approach" in public archaeology.

148. The Subtle Role of Parenting in Gender Role Formation

Naomi Eitches, Dept. of Business Foundation, with Prof. Bonnie Boaz, University College

Despite the progressively modern trend towards gender equality, gender roles and gender stereotypes are still the underlying causes of numerous social problems. The prevalence of gender roles is evident from birth when the gender of the baby determines the treatment every child henceforth receives. This research analyzes how the parents or parent, unbeknownst to even themselves, subconsciously enforce gender roles on their offspring. By examining the dynamic between the parents and the interactions with their offspring, researchers have found evidence of latent parental behaviors and patterns that affect gender roles and gender stereotypes. The evidence illustrates a cycle of gender schemas that are passed from the parent to the child, this pattern is repeated continuously through the future generations. The research also indicates how this cycle, usually continued by the father, is an albatross to society as it also carries with it destructive behaviors, gender confusion, gender oppression and a gender binary. The cycle can only be stopped if the subliminal pressures attached to gender are eliminated. Until parents understand their involvement in enforcing strict gender binaries, they will continue to not only be a burden on their children, but also contribute to the struggles other children face as a result of gender stereotypes and confusion.

149. Effects of crayfish predation on physid snail recruitment

Joseph Neale, Dept. of Biology, with Dr. James Vonesh, Dept. of Biology

With levels of biodiversity decreasing across the globe for reasons that are often explained by human activity, the need for understanding the benefits of a diverse assemblage of organisms has never been greater. Among the animal kingdom, predator species have faced the brunt of the losses in population sizes and extinctions. The purpose of this study was to examine the effect of the presence or absence of *Orconectes* crayfish on the population dynamics of *Physa acuta* over multiple prey generations. This study system is based on rock pool ecosystems on the James River. As one of the most abundant species in these rock pools, physid snails are important drivers of nutrient transfer. 12 10-gallon aquariums were stocked with 20 adult *P. acuta*, with half of the tanks containing one crayfish and half containing no crayfish. Over the course of four months, data was collected four times on the average shell length and width, population sizes, and number of egg masses per tank. The predator treatment had a significant effect on the number of survivors and egg masses, with predator treatment tanks exhibiting lower survivorship and no egg masses observed. Fewer large snails were observed in

the predator treatments. The treatment also had a significant effect on the relative shell widths, with predator treatment tanks containing snail with narrower shells. This is possibly an adaptive effect to become less vulnerable to the feeding style of the crayfish. The results of this study demonstrate that crayfish prey on *P. acuta* of any size, and possibly prefer larger-sized individuals. The egg data suggests that either the crayfish were consuming the eggs, or the prey were not reproducing due to the presence of a predator. Future studies should examine which of these mechanisms causes the suppression of physid recruitment.

150. The Breadwinning Father May Be Harder to Replace Than We Thought

Alex Duran, Dept. of Biology, with Prof. Bonnie Boaz, University College

The roles of fathers in modern society have changed since the 1970s. An analysis of multiple scholarly articles reveals that most research done on paternal child rearing techniques yield negative views of fathers as breadwinners only. The purpose of this paper is to examine and discuss research done on paternal norms and ideologies in order to understand modern views of paternal behaviors. Research shows that paternal ideology has been shifting from the acceptance of a breadwinning model to the endorsement of an androgynous model. However, despite the call for a more androgynous father, paternal behavior has persisted around the breadwinning model. The paternal breadwinner includes a less involved father who is focused more on providing economic support for his children rather than actually spending time with them. The androgynous father is less focused on the monetary support he brings to his family and instead values the emotional support he provides for his children. Most research done on the behavioral norms of father's uses a homemaker model of parenting to define a good parent. Using the homemaker model of parenting skews research on paternal behavior since most fathers actually follow the breadwinner model and the homemaker model is designed after the behavior of a stay at home parent. Until researchers construct a research model that considers the androgynous model as well as the breadwinning model of male parenting the measurement of good fathers will remain rooted in the homemaker model and slanted against fathers as good parents.

151. The moderating role of religious coping in the relation between exposure to violence and aggression levels in adolescents

Michaela Crutsinger, Ronston Jackman, Dept. of Psychology, with Dr. Wendy Kliewer, Dept. of Psychology

Past literature has indicated a negative relation between religiosity and aggression, and a positive relation between exposure to violence and aggression. However, the complex relation between exposure to violence, aggression, and religiosity has not yet been studied in detail together. The present study examines the moderating role of caregiver and adolescent religiosity, specifically religious coping, in the relationship between exposure to violence and aggression levels in adolescents using data from 247 mainly African American, low-income families from Richmond, VA. The data was collected from the Kliewer Prevention Lab's Project COPE, with both the maternal caregivers and adolescents completing in-home interviews over four waves with four annual assessments. Adolescent exposure to violence was measured with

The Children's Schema Survey for Exposure to Violence (Reynolds, 2006). Adolescent aggression levels were assessed using the Problem Behavior Frequency Scales (Farrell et al., 2000). Adolescent religious coping was measured with the Children's Coping Strategies Checklist (Program for Prevention Research, 1999) and caregiver religious coping was measured with the COPE Turning to Religion subscale (Carver, Scheier, & Weintraub, 1989). The moderating role of religiosity will be examined using data from Wave 4. We anticipate that adolescent and caregiver religious coping abilities would act as a protective factor and reduce the likelihood of aggressive behavior among youth exposed to violence. Moderated regression analyses will be conducted to test the hypothesis.

152. Identification of Unknown Frankia Based on Homology at nifH and 16S Genes

Daulton Sink, UROP Summer Research Fellow, Dept. of Biology, with Dr. Joseph Battistelli, Dept. of Biology

Nitrogen (N2) is a naturally occurring element that makes up the majority of our atmosphere and is necessary for all life on earth. Despite its abundance for nitrogen to be useful it must first be processed into a useable organic form. This happens in a couple of different ways but one of the most important is the fixation of nitrogen by plant microbe nitrogen fixing symbioses which provide the plants with the nitrogen they need to grow as well as leaching nitrogen to surrounding soils. This project looked at one of these nitrogen fixing microbes that associates with many non-legume plants Frankia Sp., which is thought to be responsible for 15% of total N2 fixation. The point of this study was to use already known Frankia genomes to search through genetic data for members of the species that have had parts of their DNA sequenced but have not been properly classified. During the project there were 9 sequences coordinating to nine potentially different strains of Frankia that have not yet been categorized. Three of these were identified using 16S DNA and the other six were identified based on similarities in the nifH gene. Ultimately here we provide information about 9 unidentified Frankia strains that merit future research and a more coordinated effort for genetic sequencing.

153. Examining Automatic Facial Processing Using a New Visual Search Paradigm

Rebecca Easter, Dept. of Psychology, with Dr. Scott Vrana, Dept. of Psychology

A new visual search paradigm was employed to examine automatic facial processing. Undergraduate participants in the U.S. and in Cyprus completed a task that measured reaction times in identifying the presence or absence of a target letter. Participants also completed questionnaires on social anxiety and demographic information. In the preliminary experiment, social information processing was manipulated in 20% of the trials by distracting participants with a neutral human face or a neutral object. Attentional load was manipulated by having either different letters on the screen (high) or 0's (low) in addition to the target letter. Reaction times were found to be longer with neutral faces compared to neutral objects as distractors and on high compared to low attention load trials. Faces were more distracting during high attention load. Similar findings were obtained in the U.S. and Cypriot sample. Results suggest this as a useful paradigm for investigating automatic processing of social

stimuli across cultures. The current experiment looks at the effects of neutral and affective faces as distractors. Attentional load was manipulated in the same manner, and social information processing was manipulated in 20% of the trials with the use of a neutral human face or an emotional face. The affective faces varied by condition: angry, fearful, or happy. Results will be analyzed using an analysis of variance and will help determine if individuals high in social anxiety are more threatened by neutral or emotional faces. Current research supports both possibilities; social anxiety could cause people to feel more threatened by neutral faces because of difficulty deciphering the face. Conversely, individuals could be more distracted by faces with negative emotions because of the overt threat. Thus, this study aims to resolve the discrepancy.

154. The Investigation of Protrusion Dynamics in Motor Neurons

Alexander Burkard, UROP Summer Research Fellow, Dept. of Biology, with Dr. Gregory Walsh, Dept. of Biology

Intrinsic cellular processes, such as neural migration, establish the fundamental electrical framework during vertebrate development. Despite the terminal implications of these events, much of the knowledge ascertained on the regulation and dysregulation of neural migration in vertebrate organisms is still unclear, specifically those processes involving planar cell polarity (PCP) genes in *D. rerio*. A great deal of work has been conducted in recent years in an effort to understand these "anomalies of life." Like similar experiments, this study employed *D. rerio* as a subject of investigation, with an emphasis placed on the characterization of neuronal protrusion dynamics via time-lapse confocal microscopy at the 18-hour time point of embryonic development. Additionally Nhsl1b, Scribble, and Prickle1b, three core PCP genes expressed in the neural epithelium of *D. rerio* (Wu 2011), were examined and characterized when dysfunctional during migration, and other cellular and developmental processes are phenotypically impacted as a result of this dysfunction. Protrusion dynamics were observed in the wild type and mutant lines, with migratory defects occurring in all mutants. The detection of differences in direction, duration, and speed of filapodia protrusions in wild type and mutant facial branchiomotor neurons (FBMN) were determined. The phenomenon of "contact inhibition of locomotion" (CIL) was observed in WT and mutant environments, which resulted in stalled motor neuron motility, and contranatant repolarization.

155. A Genetically Informative Study of the Relationship between Callous-Unemotional Traits and Startle Reactivity in a Juvenile Twin Sample.

Burchett, J., Hahn, S.E., Carney, D.M., Savage, J.E., Hettema, J.M., Roberson-Nay, R.

Evidence suggests that callous-unemotional (CU) traits have a strong genetic influence (Viding *et al.*, 2005). Studies also show that children with elevated CU traits show a diminished fear response to fearful pictures compared to healthy subjects (Marsh *et al.*, 2008). Similarly, research with adults has shown a diminished startle response in individuals with antisocial personality (Patrick, Bradley, and Lang, 1993). The current study will examine the association between CU traits and startle responses in a sample of juvenile twin. Twins will allow for the examination of genetic versus environmental contributions to CU traits, fear-potentiated

startle, and their shared association. The current sample consists of approximately 300 twins (n=~150 twin pairs; 42.3% monozygotic) aged 9-13 who were recruited by The Mid-Atlantic Twin Registry (MATR). Twins participated in a fear conditioning paradigm known as "Screaming Lady" (Britton, 2011), which is a classical conditioning task that measures fear-potentiated startle. Startle magnitude was assessed by placing electromyography (EMG) sensors below the participant's eye. Parents of twins were administered the Inventory of Callous-Unemotional Traits (ICU) to assess their child's level of CU traits. Correlational analyses were conducted to examine the relationship between startle response and CU traits. Biometric modeling also was conducted to assess the heritability of CU traits, startle response, and their shared genetic covariation. Preliminary analyses were done using an ADE model and indicated that about 57.3% of individual variance was due to genetic factors, while 42.7% could be attributed to the twins' unique environment. These early outcomes suggest that genetics play a large role in the development of CU traits.

156. Stability of the wrist-worn ActiGraph GT3X+ as a predictor of anthropometric measures and cardiorespiratory fitness in obese adolescents

Eric Prince, Community Engaged and Translational Research Fellow, with Dr. Ronald Evans, Dept. of Health, Physical Education, and Exercise Science

Purpose: To determine whether physical activity (PA) participation assessed using the wrist-worn ActiGraph GT3X+ is related to body weight, body composition and maximal oxygen consumption (VO_{2max}) in obese adolescents before and 3 months after lifestyle treatment. **Methods:** Body weight, body mass index (BMI), body composition, VO_{2max}, and PA participation were assessed in twenty-one obese adolescents (mean age = 12.7 ± 1.3 years, mean BMI z-score = 2.3 ± 0.4) prior to and after 3 months of participation in a behavioral weight management program. To track changes in PA behaviors, participants wore an ActiGraph GT3X+ accelerometer on the non-dominant wrist for one week at both time points. Whereas a lack of published cut points for the wrist-worn ActiGraph currently precludes quantification of the intensity of PA in this population, we chose to examine associations between the raw activity counts per minute (CPM) and body weight, body composition, BMI z-score, and VO_{2max} before and three months after treatment. **Results:** Following treatment, BMI z-score (-0.6 ± 1.4, p = 0.009) and fat mass (-2.1 ± 4.1 kg, p = 0.027) significantly decreased, and accelerometer CPM increased (+145.1 ± 302.5 CPM, p = 0.040). The wrist-worn ActiGraph GT3X+ CPM was significantly ($p<0.05$) related to anthropometric measures and cardiorespiratory fitness both prior to and after lifestyle obesity treatment. We subsequently assigned participants to two groups based on whether the change in CPM was above or below the median value of 250. Despite no differences in anthropometric changes, adolescents in the high-CPM change group demonstrated a significantly higher increase in VO_{2max} than those in the low-CPM change group (+5.0 ± 3.2 ml/kg/min vs. + 1.1 ± 3.4 ml/kg/min, p = 0.021). **Conclusion:** Following program participation, VO_{2max}, but not anthropometrics, was improved to a greater extent in adolescents with the greatest increase in CPM. Given these findings, future studies in this population are needed to develop activity cut points for the wrist wear-site in order to examine changes in time spent engaging in sedentary behaviors and moderate-to-vigorous PA.

157. The Western Australian Desert, Mardu Aboriginals, and Fire-patch burning: The Connections

Eleanor Mudd, Dept. of Anthropology, with Dr. Christopher Stevenson, Dept. of Anthropology

The Mardu are a desert-living group of nomadic, hunter-gathering people that live in the Pilbara Region that is within the Western Desert of Australia. They have inhabited the Australian desert for at least 45,000 years and are currently among the oldest living culture in the world. Their unique lifestyle of living in the Australian outback is based off of 3 important aspects. These aspects of lifestyle consist of the first priority being the land, followed by Dreamtime, and then family. In my research, I will be focusing on the Mardu relationship to the land. The land provides an important traditional diet that is based off available game but the method to getting this game is on an approach of lighting fires. Fire-patch burning to the Mardu is the method of regularity and systemically burning patches of vegetation. Burning patches of vegetation brings animal and plant species population recovery in a way that many researchers and government officials question the intention to these burnings. The research into this study of the Mardu will not only help with the understanding of Mardu lifestyle but the biodiversity that is produced from these fire-patch burnings.

158. Communicating the overall experience of research through various approaches using art: a case study of the Prothonotary Warbler

Hannah Huddle, UROP Summer Research Fellow, Dept. of Communication Arts, concentration in scientific illustration, with Dr. Lesley Bulluck, Dept. of Biology

In the scientific community and in scientific publications, often there is a lack of compelling visuals, and the language used in explaining the results of experiments and studies is very specific to the field, and inaccessible to the general population. Often, scientific research has publication and data as the end goal. Research is not valid unless it is published in a peer-reviewed scientific journal. The process and experience, which are of great importance in art disciplines, is not necessarily represented or valued. However, science is much more than data, it has an inherent element of art to it, which deserves to be shown, and would likely make science more accessible to the general public. Art has historically linked the public to concepts that would otherwise be difficult to grasp, and has the power to excite in the way that words often cannot. I have been studying alongside a team from the Department of Biology, as students and faculty study the breeding ecology of the Prothonotary Warbler, to learn how I can reinterpret the research in a way that bridges the gap between the experience and typical scientific products. The research team measured spatial and temporal variation in warbler prey abundance (caterpillars and mayflies) and assessed how this affects warbler breeding success. Field work involved canoeing to access and collect reproductive data from nest boxes, collecting caterpillar data using branch clippings from the surrounding forests, and deploying light traps to collect emerging mayflies. I have used this experience in my own illustrations and research, and to lead others who engage in scientific research to explore other ways of sharing their findings and experiences that are more accessible to those outside of their discipline. I have kept a sketchbook which doubled as a field journal, which I took sections of to compile a zine. In the fall, I made both traditional scientist illustrations for use as reference in data collection and continued to sketchbook and paint. In the winter, I traveled with an extended group to

study the bird in its nonbreeding location (Panama). I have learned how though there is a lack of communication using visuals, the research has been able to impact many groups of people, from children in Panama to working professionals, through many human interactions. Through direct interactions and enthusiasm, those who do not partake in the visual arts have been able to share their experience in research in a way similar to what I found myself exploring in visual language. In my work, I aim to capture these experiences that have impacted me as a scientist, artist, and creative thinker.

159. Poverty in Guatemala

Yonatan Getachew, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

One of the main issues is Guatemala is poverty. In 2000, over half of all Guatemalans nearly 60%, or about 6.4 million people lived in poverty (Avivara). More recent statistics indicate that the percentage of Guatemalans living in poverty has been rising and is now estimated at closer to 64% with slightly over 30% living in extreme poverty - a level where families are unable to obtain the minimum daily caloric intake of food (Avivara). Also the poverty in rural areas in Guatemala is also heavily populated and the rural population accounts for a large majority of the country's poor people. Guatemala is known as one of the highest poverty rates in Latin America. Some of the biggest causes of poverty and suffrage Guatemala faces are the multiple forms of violence and high levels of impunity. Based on the extreme violence extreme violence, insecurity and limited access to justice are factors that prevent development in general, and particularly ensure the continuation of poverty and social exclusion (Molina). Impunity derived from low coverage and poor quality of justice is one of the major drivers of poverty (and intergenerational reproduction of poverty), because long exposure to a violent environment prevents otherwise perfectly healthy women and children gaining access to economic and social opportunities that may help them escape from the poverty trap (Molina). Another form of poverty that is an issue is the lack of what supply they get. The nation's water supply is at risk due to industrial and agricultural toxins. Guatemala has 27.8 cu mi of water with 74% used for agriculture and 17% used in farming activity (Molina). One o f the ways we can address and reduce poverty is, by economic development policy is to create rural employment through the provision of investment incentives. Such enticements include inexpensive financing by government institutions, free assistance and technical support, and preferential treatment to use government facilities and institutions for guidance (Molina). Guatemala known for their fruits and coffee even though in 2001 low coffee prices harmed the economy I think that’s one product that should be high on the market. In 2003, the International Monetary Fund (IMF) approved a nine-month, $120-million Stand-By Arrangement to support Guatemala's economic program through March 2004 (Molina).

160. Identity Crisis

Christian Martinez, Dept. of English, with Prof. Bonnie Boaz, University College

Despite the fact that Hispanic Latinos make up 16% of the population and are the largest minority in the United States, research shows that they don't lead any major corporation, have no influence on Wall Street or Hollywood, are only bit players on any major stage and that this lack of representation is leading to an identity crisis among Hispanics in America. Americans are hard pressed to find a household name of a Hispanic/Latino who has fought for civil rights. There's Cesar Chavez, but he only lead the union agricultural workers in California. Although he was made a national leader, he didn't lead in fighting for Hispanic/Latino civil rights. This project focuses on research related to the lack of leadership and voice among Hispanic/Latinos. Research shows that one of the biggest problems is that Hispanics are not monolithic, which means, they do not have a shared identity in which to fight for a greater cause. Unlike the African American community that has a history of enduring powerful discrimination and slavery, Hispanics have no common shared history. In fact, research has shed light on the fact that Hispanic and Latinos discriminate among each other based on skin color, social class, and cultural background. The lack of a shared identity, and the discrimination within the community itself, has caused the Hispanic and Latino communities to remain silent, allowing other minorities to dictate the voice for the Latino/Hispanic community in this country. The jury is in; the Latino/Hispanic population is becoming aloof when it comes to influencing American culture.

161. Natural Disasters in Guatemala

Arturo Barron, Dept. of Homeland Security and Emergency Preparedness, with Dr. Jason Levy, Dept. of Homeland Security and Emergency Preparedness

The country of Guatemala on the whole is susceptible to natural hazard events; disasters can be heavy downpours, volcanic eruptions and earthquakes. Guatemala is prone to natural disasters, according to Charveriat (2000), twenty-eight disasters between 1979 and 1999. These earthquakes were not only devastating to home and other structures but also affected the lives of those who lived near the epicenter and surrounding areas. Guatemala has suffered the largest number of fatalities due to disasters in all of Central America, for a total of 24,139 people,or 2.2 fatalities per thousand inhabitants (Vazquez, Bohara, A. 2010). The death of so many people in such a small country is detrimental to the emotional well-being of the survivors. Despite unpredictable seasonal rains and resulting challenges, residents continue living in remote and vulnerable circumstances. People chose to live in these areas that are prone to natural disasters because it is the only place they have ever lived. Their lives are rooted in these communities that are constantly being impacted by natural disasters. Landslides occur when heavy rains or seismic activity break threshold conditions in increasingly unstable slopes (Restrepo et al. 2009). Landslides destroy homes, roads, and crops devastating the lives of the inhabitants in the mountainous regions of Guatemala. Despite these constant natural disasters in Guatemala, residents have continued to live in these areas prone to natural disasters for many, many years.

162. Seen and not heard: understanding submissive behavior as a result of childhood emotional neglect

Natalie Buffington, Dept. of Elementary Education, with Bonnie Boaz, University College

We are all products of our environments. Our parents are the first models of how we should grow up to live. Imagine growing up in a household of silence and neglect. Children raised in these circumstances may lack basic knowledge of how to healthily engage with others. What kind of example do they have for any future relationships of their own? This research studies children's development of healthy and unhealthy attachment styles and the effect on adult attachment in relation to their quality of intimate relationships both physically and psychologically based on those childhood attachment styles. Particularly, there is a focus on submissive or "people pleasing" behaviors as a grim consequence of poor attachment styles. Taken together, research shows the serious impact on mental health after a childhood of maltreatment.

163. Heterotrophic microbial growth in carbon limited environments

Priya Venkatesan, UROP Summer Research Fellow, Dept. of Biology, with Dr. Joseph Battistelli, Dept. of Biology

Carbon limited environments enrich for a unique group of bacteria. This study sought to understand changes in microbial communities after radical reduction in carbon availability. Bacteria from the James River were cultured and then used to inoculate R2A media of different concentrations (1%, 10%, 50%, and FSDI) in a 96 well plate. Abundance was monitored through proxy using absorbance measurements and quantitatively through plate counts. Growth-curve analysis provided a numerical assessment of heterotrophic growth seen in simulated limited nutrient environments. Results indicated that the bacteria could survive in conditions with limited carbon availability. The highest growth rate was seen at t = 3, 50% R2A media had the highest absorbance of .33 nm. A 4x3 mixed-design ANOVA test concluded that the experiment is significant, $F(3, 36) = 687.11$, $p < .05$. This experiment serves as base work for future research looking into the viability of heterotrophic organisms experiencing a rapid change in organic matter availability, and for an increased understanding of how life may be or have been disseminated throughout the universe during panspermia.

164. Substrate Recognition of NTMT1

Pahul Hanjra, Dept. of Chemistry, with Dr. Rong Huang, Dept. of Medicinal Chemistry

The protein N-terminal methylransferase 1 (NTMT1) is responsible for transferring methyl groups from S-adenosyl-L-methionine (SAM) to the a-amino terminal of its substrates, resulting in the formation of S-adenosyl-L-homocysteine (SAH) and a-n-methylated proteins. NTMT1 is biologically significant due to its overexpression in certain cancers as well as its importance in mitotic spindle formation during cell mitosis. One identified substrate of NTMT1 is SET1 (also known as PP2A). SET1 plays a role of tumor suppression through its inactivation of kinase driven cell-signaling pathways. Thus, it is of great interest to explore the mechanism by which SET1 is methylated by NTMT1. To explore the progression of SET1 methylation by NTMT1, methylation assays were performed in the presence and absence of an inhibitor and individual methylation states were quantitated using MALDI-MS to characterize the methylation

distributions as a function of NTMT1 activity on SET1 with and without an inhibitor. Additionally, to more completely understand the influence of specific NTMT1 residues on its ability to bind to SET1, mutagenesis and kinetics studies are underway. Results show that SAH is a moderately successful inhibitor of SET1 methylation and that the V_{max} value for NTMT1-catalyzed methylation for SET1 is 0.35 μM min^{-1} and the K_m value is 0.17 μM min^{-1}. Future studies will feature the mutagenesis of specific residues on NTMT1 to determine the effects on the enzyme binding ability to SET1 as well as other substrates.

165. Fossil Bovidae of Cooper's D, and their significance to the paleobiology of Paranthropus robustus.

Samantha Meacham, UROP Summer Research Fellow, Dept. of Biology, with Dr. Amy Rector Verrelli, Dept. of Anthropology

Paranthropus robustus shared morphological synapomorphies with the Paranthropine hominins including derived chewing adaptations usually associated with hard and/or tough food, but was unique among the clade in its South African geographic and temporal context, its ecological context, and potentially in details of enamel thickness, microwear, and diet. The Cooper's Cave System of the Bloubank Valley, Gauteng Province, South Africa, has yielded multiple *P. robustus* specimens, as well as a rich associated mammalian community. Dated to 1.5-1.4 Ma with Uranium series, Cooper's D is the best constrained age for a *P. robustus* assemblage in southern Africa, and thus provides a unique opportunity for habitat reconstruction that is clearly situated both temporally and geographically. This study consists of new identification and description of mammalian fossils, specifically Bovidae, recovered from stratigraphically constrained deposits of Cooper's D, for analyses of both biogeographic and paleoenvironmental factors influencing *P. robustus* ecological parameters and adaptations. Fossil species were identified to genus and species when possible, and were allocated to a size class. Analyses of taxonomic and ecological diversity indicate that the Cooper's Cave fauna is similar to that of other, contemporaneous *Paranthropus* sites, but that the cave underwent unique taphonomic processes during deposition. Additionally, results can be included in detailed biogeographic and paleoecological analyses of the Cooper's D bovid and faunal community that can be compared with other *Paranthropus*, *Australopithecus*, and *Homo* sites in southern and eastern Africa

166. How Does Breastfeeding Affect the Occurrence of Postpartum Depression?

Elisabeth Lamas, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

According to the 2008 CDC report, nearly one out of every eight women are affected by postpartum depression at one point or another in their lives. The purpose of my research was to study the potential effects of breastfeeding on postpartum depression. The objective was to study how breastfeeding affects the occurrence of postpartum depression in mothers in the United States. To understand the relationship between postpartum depression and breastfeeding, I read science journal articles describing the biological background behind

breastfeeding and postpartum depression. I read psychology and biology journal articles dealing with possible forms of treatment for postpartum depression and how they may be affected by breastfeeding. Also, I read science journal articles dealing with the cause and effect relationship between the two. From my research, I came to multiple conclusions. First, breastfeeding does help to prevent and reduce the occurrence of postpartum depression. Although this is true, the cause and effect relationship between postpartum depression and breastfeeding depends on the situation. For example, for some individuals, lack of breastfeeding may cause the occurrence of postpartum depression. In other cases postpartum depression may cause the early cessation of breastfeeding. There is no definitive answer. After gathering all my research, there is still much research that needs to be conducted in this field. One question for example, that has yet to be answered, is why are some women genetically predisposed to be more likely to suffer from postpartum depression than others? Also, why are some women because of their genetics, more successful at breastfeeding than others? In terms of further research, studies should be conducted to determine what is the best method to encourage the practice breastfeeding, as this would be the most helpful step in reducing the overall occurrence of postpartum depression.

167. The Efficacy of Art Therapy

Greer Meagher, Dept. of Cinema with Prof. Faye Prichard, VCU Honors College

There is speculation in the therapy and health communities about whether or not art therapy is an effective treatment method of decreasing symptoms for those who suffer from mental illness. Based on this motivation, I wanted to see if making art through art therapy helped those with mental illnesses alleviate their symptoms, and if it did, how it did so. I looked at a number of art therapy and psychological articles on the subject, in order to see what current researchers and therapists were saying about the topic. I looked at articles that analyze the background and previous implementation of the art therapy method on a broad scale, articles that showed data from isolated art therapy treatments in group and individual settings, and articles that looked specifically at art therapy methods for treating depression. With this research, I found that although there is not a great deal of substantive research on the efficacy of art therapy, it seems to work when the methods are partnered with guidance of a skilled doctor, therapist, or art therapist. At this point, there needs to be more research done on how art therapist can be most effective in the treatment plan, as well as how effective art therapy is when patients try to apply their learned skills on their own, post-therapy.

168. A Genetically Informative Study of the Relationship between Callous-Unemotional Traits and Startle Reactivity in a Juvenile Twin Sample.

Megan Dell, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Soccer is the most popular sport internationally and the amount of 12-18 year old male soccer players developing a varus alignment, a bending of the legs that cause an increase in intercondylar space between the knees, is greater than other sports where the athletes undergo similar movements. The advantages and disadvantages offered to the athlete is rarely

researched. This study reviewed dozens of related articles covering the role of growth, fatigue, kinematics, and osteoarthritis of male soccer players. According to the research, players with a varus alignment are less likely to have an ACL tear due to medial knee loading instead of lateral knee loading, loss of athletic posture which could increase the probability of injury especially during fatigue, and have an increased agility due to greater adduction angles and knee angles which cause more torque for quicker cutting movements. Ultimately, soccer players benefit due to decreased injury rate, an increase in agility, but suffer from more knee cartilage damage causing a higher chance of osteoarthritis.

169. The Use of Oxytocin as a Preventative Treatment for PTSD

Laurel Kovalchick, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Posttraumatic stress disorder (PTSD) is a mental health disorder triggered by experiencing a traumatic event. PTSD causes recurrent flashbacks of traumatic memories that lead to over-consolidation. Memory over-consolidation prevents extinction of emotional and physiological responses to the memory. Because individuals can respond differently to stress and frightening experiences, no measures are currently practiced to prevent PTSD. By studying the changes in the brain during PTSD and after stress, it can be hypothesized that treatments that regulated HPA axis activity may prevent PTSD symptoms if applied soon after stress. Risk of developing PTSD is associated with abnormal cortisol and norepinephrine levels and altered hypothalamic-pituitary-adrenal (HPA) axis functioning after trauma. New research on how stress alters the HPA axis over time has opened up the opportunity to prevent PTSD in high-risk patients. Oxytocin has been shown to regulate the HPA axis by inhibiting amygdala activity and the fear response. Oxytocin may also reduce stress by increasing the benefit individuals receive from social support. After reviewing previous studies on oxytocin, PTSD, and the HPA axis, it was concluded that regulation of the HPA axis by oxytocin could prevent PTSD by inhibiting memory over-consolidation and by reducing physical damage to the brain caused by abnormal cortisol and norepinephrine levels. This neurotransmitter is suitable for pharmacological studies because oxytocin can reach the central nervous system safely and effectively through intranasal spray application with minimal side effects. Intranasal oxytocin's anxiolytic qualities and ability to alter HPA axis function call for more research to evaluate its potential pharmacological applications. More research is needed on regulation of the HPA axis to prevent PTSD and the duration and dosage of oxytocin treatments necessary to achieve sufficient HPA regulation.

170. The Influence of League Structure, Presentation, Corruption, and Sport Format on the Success Level of United States Professional Boxing and Football

Prabhu Sasankan, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Over the last 100 years, professional boxing regressed from a national presence in the United States to a niche sport for a select audience. This decline stemmed from several interrelating factors. On the other hand, during this time, football saw a tremendous rise in popularity, becoming the most popular sport in the United States. This study uncovers and analyzes

factors that contributed to the decline in popularity of professional boxing, and evaluates these factors in the context of professional football, in order to determine if football's rise in popularity is due to these influences. This study further explores whether football's popularity will endure in the future as a result of these factors. The views of experts in football history, boxing history, and fan loyalty and motivation are considered, and four principle influences are seen to correlate to the decline of boxing as well as the growth of football: multiple commissions versus single league, pay-per-view versus network television broadcast, corruption versus integrity, and individual versus team competition. This study determines that the NFL has a structure that can ensure its future success and discusses how other professional sports can avoid the factors that led to the decline of boxing.

171. The Proliferation Resistance of the Thorium Nuclear Fuel Cycle and Other Nuclear Reactor Designs

Jacob McGill, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Although nuclear power is widely acknowledged by the scientific community as a clean energy source, its successful implementation is often limited by nuclear proliferation concerns. Most modern nuclear reactors run on uranium or plutonium fuel, which carries significant risk of proliferation because the waste they produce can be used in the construction of a nuclear weapon. Furthermore, practically all currently operating nuclear reactors can be altered to enrich uranium to weapons-grade quality, with minimal risk of detection by the international community. The use of thorium as fuel for nuclear reactors has been suggested since the late 20th century, given its abundance in the Earth's crust and its ability to improve nonproliferation efforts. By reviewing published literature and analyzing several newly emerging nuclear reactor designs, an attempt was made to determine which method would allow for the implementation of the thorium nuclear fuel cycle with a maximum decrease in the potential for nuclear proliferation. Research revealed that most emerging designs seek to limit proliferation concerns by either contaminating spent fuel with highly radioactive isotopes to complicate the transportation and construction of a nuclear weapon, or by ensuring that all fuel and waste products are contained and protected from possible theft at all points in the nuclear fuel cycle (such as in small modular reactor designs). Additionally, the possibility of retrofitting existing reactors to operate on the thorium fuel cycle may allow for an immediate reduction in the proliferation concerns of the widespread implementation of nuclear power. Determining which nuclear reactor designs are the most promising for limiting nuclear proliferation will allow clean energy to be implemented as quickly as possible.

172. The Trends in String Quartets Composed by European Composers Who Went Deaf in the Romantic Era

Vinh Dao, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

In music composition, deaf composers revolutionized the manner in which music was crafted. Beethoven ushered in the shift between the Classical and Romantic Era while Smetana established the national sound for Czech music after the Austro-Hungarian Empire granted Bohemia its independence during the Romantic Era. However, the music that was associated with these momentous events was composed during these composers' deaf periods. This study

attempts to discover if there are trends among the composition style of composers from the Romantic Era who went deaf. To ascertain the true nature of deaf composition, 12 scores were analyzed –5 scores from composers who were hearing or were not deaf yet and 7 scores from composers who were completely deaf. The pieces written by hearing composers and composers who could still hear were Beethoven's String Quartet No. 2, Smetana's Piano Trio in G minor, Faure's Violin Sonata, Op. 13, Bartok's String Quartet No. 1, and Mendelssohn's String Quartet No. 2. The pieces composed by the completely deaf composers were Beethoven's String Quartet 10 and 14, Smetana's String Quartet No. 1 and 2, and Fauré's String Quartet No. 1. The scores were examined rather than recordings of these pieces as modern string quartets, piano trios, violin and piano duet players would not be able to replicate the sound and style of music from the Romantic Era. In particular, this study found that deaf composers featured an increased number of fortes, fortissimos, sforzandos, and subito fortissimos, a higher number of crescendos and decrescendos, a smaller percentage of notes that had a frequency equal to or above G6, and a large number of repetitive passages that are doubled and/or tripled, which results in an unbalanced sound between the melody and the accompaniment. As these trends were observed within all of the deaf composers in the Romantic Era being studied, this study contends that these trends could be ubiquitous among deaf composers. In the future, an additional study should be conducted among different musical eras to conclude the nature of deaf composition.

173. HHV-6 Induced DNA Damage Leads to MicroRNA-34a Downregulation and Viral Protein ORF-1 Association Causes p53 Downregulation: Oncomodulation of Glioma Multiforme

Ronil Vaghjiani, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

As classified by the World Health Organization, Glioblastoma multiforme (GBM) is the most common and malignant type of brain tumor. Composed of four subtypes, GBM has a variable response to aggressive therapy, making treatment extremely difficult. Risk factors associated with the formation of GBM include human herpersvirus 6 (HHV-6). HHV-6 is a human virus that is effectively present in the entire human population with infection typically occurring within the first two years of life. Because of its wide reach and enigmatic nature, understanding the etiology of HHV-6 associated oncomodulation has become ever more precedent. Similar to HHV-6 virology, (HHV-5), better known as Human Cytomeglovirus (HCMV), is a human herpesvirus that has been widely studied for its possible connection with tumor formation. In past studies, HCMV has been shown to exhibit low frequency chromatid breaks and double-strand breaks (DSB) at chromosomal positions 1q42 and 1q21, causing G1 phase inhibition of the cell cycle. Consequentially, DNA repair mechanisms during the G1 phase primarily involves non-homologous end joining (NHEJ) which is error-prone and does not require sequence homology. Furthermore, a variety of neuro-oncology studies have documented the high presence of HHV-6 DNA in glioma tissues and have suggested a possible correlation that relates its presence with gliomagenesis. The objective of this study was to examine the consequences of DSB as a result of HHV-6 viral integration. The literature supports the hypothesis that 1p36 chromosomal damage results in microRNA-34a tumor suppressor downregulation. Furthermore, viral gene ORF-1 expression binds with tumor suppressor p53, effectively inactivating the complex. p53 inactivation is believed to lead to further reduction in microRNA-34a expression. These malformations compound and affect downstream processes ultimately resulting in the oncomodulation of glial cells. Further

analysis of these mechanisms must be conducted to determine the risk factors associated with HHV-6 infection.

174. Queer Mysticism in the High Middle Ages: Pain, Love, Earth, and the Female Body in the Illustrations of Hildegard of Bingen's Scivias

Becky Bushnell, Dept. of Painting and Printmaking, with Prof. Mary Boyes, VCU Honors College

Many view Hildegard of Bingen as one of the most important female theologians of the 12th century, and her writing and sphere of influence is remarkable considering her gender. Many scholars, like Barbara Newman, Caroline Walker Bynum, and Carolyn Worman Sur, agree that Hildegard's portrayals of God in *Scivias* are distinctly feminine. Scholars like Karma Lochrie, Sheryl Chen, and Flora Lewis have written on Christ's wound as a metaphor for the womb or vulva. Yet what scholars don't seem to focus on, as Lochrie writes in "Mystical Acts, Queer Tendencies," is the ways that the work of many female mystics in the 12th and 13th centuries falls outside of modern conventions of normal gender and sexuality. According to Lochrie, there exists a false "master narrative" which presents mystical interactions with God as indefinitely heterosexual and sometimes even ignores or twists evidence to fit this narrative. I claim that one could consider Hildegard's visions in *Scivias* "queer" due to: her focus on the physicality and femininity of Christ through the figure of Caritas, the distortion of sexual gender norms through the feminization of Christ, and the conflation of pain with love and with the female body through maternal and/or erotic metaphors. By examining the text and illustrations of *Scivias* and the relevant research, I explore Hildegard's feminine depictions of God in relation to sapiental tradition, courtly love and "love noir," and the writings of female mystics in the 12th and 13th centuries. By examining Hildegard's work in these ways, I have found elements that defy convention and the master narrative and that may further our understanding of female mystical sexuality in the high Middle Ages.

175. The Taiwanese Sex Industry and its Effects on Female Gender Stereotypes

Natalie Smith, Dept. of Graphic Design, with Prof. Mary Boyes, VCU Honors College

The social status and sexual identities of women in Taiwan have, historically, been based on the sole fulfillment of marital and reproductive duties. When the women's liberation movement and dialog calling for the legalization and restructuring of the Taiwanese sex industry arose in the early 1990's there was significant backlash from the general public, who believed they were working to protect against the perversion of their traditional Confucian views on sexuality and the role of the woman. This study critically examines analyses of early nineties feminist literature, social movements, legislative backlash, and discourse written by prominent Taiwanese feminists such as Naifei Ding and Josephine Ho, as well as examining interviews with Taiwanese prostitutes, working migrant women, and the younger Taiwanese generation. An analysis of these sources suggests that through sensationalized media coverage and misrepresentations and misinterpretations of feminist figures and the sex-industry by the public, there was a formation of a general, overall negative misogynistic view of the female gender as a whole. By increasing understanding behind the motivations of the prevailing misogyny and abuse of women within the sex industry of Taiwan, there is a greater overall ability to battle against sexism and to construct fair and protective legislation.

176. The Photography of the Women Surrealists, Claude Cahun and Francesca Woodman: A Method of Response to the Objectification of Women in Male Surrealist Art

Lois Nguyen, Dept. of Sculpture, with Prof. Mary Boyes, VCU Honors College

Objectification of women in Male Surrealist art depicted the male gaze in its darkest form, through the ideas of the uncanny, fetish, and convulsive beauty. Women were treated as objects throughout Surrealist photography and painting instead of being represented as human subjects, and their femininity and beauty was valued to the extent of held belief that a woman's destiny is to be beautiful and be present for the male gaze. Women Surrealists have gained notoriety in the last sixty years, for their presence in the Surrealist movement and for their diligence in providing the female perspective in opposition to the male perspective. This study observes the photographic works of the Women Surrealists, Claude Cahun and Francesca Woodman, and their method of response to the objectification of women. This study examines the political context of Claude Cahun's involvement in the Surrealist movement and the influence of Andre Breton, Claude Cahun and other early surrealist artists on late surrealist artist Francesca Woodman. Photographs, surrealist texts, and journal entries are used as primary sources to approach and reason why these two artists chose the medium of photography as their method response, and how objectification, photography, and the self-portrait incited the modern artist-as-subject trend through Claude Cahun and Francesca Woodman.

177. Writings on Black Women in Hip Hop Music Videos: How Feminist Authors of Different Races View Representation

Elena Gavrilovic, Dept. of Painting and Printmaking, with Prof. Mary Boyes, VCU Honors College

While there are extensive writings on the subject of black women's representation in hip hop music videos, there have been no thorough analyses of the authors themselves and how their race may play a role in their writings. To analyze the unique role that black women play in the world of feminist academia, I compared the rhetoric and stances of a number of articles involving women's representation in hip hop by both black and white feminist authors. Throughout the 1990s black authors are more likely to support black women's representation/expression of sexuality in hip hop music videos. Black authors are also more likely to acknowledge the ways in which racism affects sexism and vice versa, while white authors are more likely to take a negative stance and liken the women of hip hop to sex workers and strippers with no free will; however, by the early-mid 2000s black and white authors alike became more critical of hip hop music videos and female rappers in general partially due to the decline in popularity of so-called "feminist" rappers such as Salt-N-Pepa, MC Lyte, and Queen Latifah. Writings on feminism have been largely commandeered by white liberal women, but the debate on women in hip hop has a much more diverse pool of authors and opinions. While black women are less prevalent in the feminist movement, in the world of hip hop feminism they are the most vocal participants and there is a more obvious shift in the rhetoric between authors of different races.

178. Millennials' Perception of Indie Rock Phonograph Records in Relation to Mainstream Pop

Sean Pritchard, Dept. of Mechanical Engineering, with Prof. Mary Boyes, VCU Honors College

Research Problem: I am studying how Millennials' perceive the aesthetics and culture of indie rock phonograph record collecting because I want to know if the recent rise in phonograph record sales is the result of Millennials trying to assert cultural significance so that my reader may better understand the division and similarities of the connotations Americans associate with indie rock and mainstream pop.
Discipline: Cultural Studies

Abstract

Millennials have inconsistently defined indie rock since it was thrust onto the mainstream in 2004 with the breakout success of Modest Mouse's *Float On,* Franz Ferdinand's *Take Me Out,* and Zach Braff's Garden State. Indie rock is not defined by its sound, thereby disqualifying it as a pure genre. Indie rock is defined by its aesthetic qualities: anti-mainstream appeal, style, promotion, etc. Indie rock is flexibly defined person to person as they perceive it. Consumers define indie rock by its themes being implicitly anti-mainstream and a less-produced sound while producers define indie rock by a musician's creative control over the music's creation, distribution, and marketing. Millennials are experience-based, aesthetics driven customers and are, therefore, drawn to indie rock so that its image may be projected onto them. Businesses have noticed that marketing an experience yields higher sales and are now marketing experiences to the Millennial demographic. Independent musicians have often deluded their music with pop themes and production in order to appear more marketable and attractive to major record labels, thus blurring the line between indie rock and mainstream pop. I conducted research on the top 5 year-end songs according to Billboard and Pitchfork from 2014-2004, Billboard representing mainstream pop and Pitchfork representing indie rock. I analyzed these accepted indie rock songs against accepted mainstream pop songs to find that there is no distinct overarching difference between what is deemed indie rock and what is deemed mainstream pop. Business are adept and finding their target audience and always being able to sell what someone may want to buy. Indie rock has a consumer base who values the individuality and perceived authenticity of indie rock, however, indie rock is just a product marketed to this section of the consumer base and perceived authenticity is perceived after all.

179. Sistani is Poised to Lead Iraq as a Non-State Player Following Western Force Withdrawal

Grayson Chenault, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

The state-building process in Iraq is perhaps the single most defining US foreign policy endeavor in the first decade of the 21st century with an occupation spanning from 2003 to 2011. The Middle East is a quickly developing region, but remains plagued by religious conflicts both amongst the Abrahamic religions and between Islamic sects. Religion remains a pillar of legitimacy in a sea of transient regimes that enables it to serve as the cornerstone of political movements, primarily in opposition to a given state. Understanding the current political dynamic of the Middle East in general, and Iraq as a proxy of sectarian disputes in particular, is crucial to regional and global safety as radical groups continue to present influence abroad. This study examines pertinent articles in order to draw conclusions about the constitution drafting, electoral success, and subsequent conflicts in Iraq from 2003-2010. The Shiites whose allegiances split amongst Sadr, Sistani, and the SCIRI headed the constitution drafting process, but made active efforts to include religious and ethnic minorities,

such as the Kurds, as well. The first two sets of elections under the new government were marked by a large number of candidates and strict adherence to existing ethno-religious ties which caused many to question the elected officials. As a result, these were voted out decisively in the 2006 elections and more radical elements among the Iraqi populace took to militant action to express their dissatisfaction. Continued US involvement allowed the West to serve as a foil for nationalistic Iraqis, namely Sistani, who gained broad support for presenting an image of a unified Iraq. Following the civil war and withdrawal of Western occupation forces, Sistani is poised to direct Iraq as a non-state player.

180. Females in Combat: An Evaluation of the Utilization of Women in Ground Combat Units of the U.S. Marines

Catherine Boggs, Dept. of Art History, with Prof. Mary Boyes, VCU Honors College

The U.S. Marine Corps recently made the controversial decision to introduce women into combat units. This decision has come with a considerable amount of controversy due to the differences in physical standards between men and women, and the supposed ineffectiveness of women to successfully carry out combat duties. Through a review of research, this study proves that women are both effective and needed in ground combat for the U.S. Marine Corps. An analysis of the research reveals the extensive and all-encompassing nature of combat requirements, which challenges the main arguments from those opposing women in combat—the PT argument (women don't meet the same standards and are therefore unfit for combat), the maternity argument (women who take maternity leave will have to be retrained), and the SAIM argument (sexual assault in the military is inevitable and proves that gender mixing in combat is a failed social experiment). Although studies on women in combat have been increasingly more common in the past decade, women have often been considered one entity. This study examines the differences in experiences and backgrounds among women in the military, and will contribute to future studies on women in ground combat units of the U.S. military.

181. Reversing the Effects of Tendinopathy and Preventing Tendon Rerupture after Surgery in Athletes Using Platelet-Rich Plasma

Shiv Patel, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

Lesions are common injuries among amateur and professional sports players and an overwhelming 30-50% of them occur in the tendon. Excessive loading of the tendon or the use of fluoroquinolone antibiotics brings on tendinopathy, a precursor of tendon rupture. The tendon anatomically has both a low blood supply and low cell turnover rate, which contribute to the ease by which an athlete can develop tendinopathy. Chronic tendinopathy has very few high-success treatments but in recent years, platelet-rich plasma (PRP), a treatment in which platelets are isolated from the patient's blood and injected back into the diseased tendon, has seen promising results. Prior research has focused on assessing the viability of PRP as a treatment but failed to come up with a standard and procedure protocol for its administration. This study evaluated PRP in terms of success rate, concentration of cells other than platelets, concentration of growth factors, life of growth factors, and size and cross section of the tendon to develop a formulation standard, injection plan, and procedure protocol for different

tendinopathies. Furthermore, this study develops a comprehensive rehabilitation program that takes into account both the treatment and natural healing process of the tendon to shorten the time the athlete spends off the field.

182. The Progression of the Representation of Girl Power, Femininity, Empowered Sexuality, and the Heterosexual Script in Relationship with Female Protagonists in the Sci-Fi/Fantasy TV Shows Orphan Black and Buffy the Vampire Slayer

Dakota Becker, Dept. of Painting and Printmaking, with Prof. Mary Boyes, VCU Honors College

Broadcast television has been plagued by the misrepresentation and absence of progressive female protagonists. Contemporary television programs have begun to address issues of diversity and empowerment, but it is questionable whether substantial strides in the representation of women have truly been made. The science fiction and fantasy genres in particular are infamous for perpetuating rampant sexism and the objectification of female characters. I analyze aspects of the television shows *Orphan Black* and *Buffy the Vampire Slayer*, two broadcast television series which aired over ten years apart, to broadly evaluate whether the science fiction and fantasy genres have progressed or regressed in terms of feminist values in the past decade. The criteria by which the two series are evaluated include the presence of the postfeminist "Girl Power," the appropriation of "masculine" heroic power in conjunction with femininity, the presence of empowered sexuality, and heteronormativity. The research reveals that, according to the above criteria, *Orphan Black*, which has not previously been studied academically and which is an ongoing television series, surpasses *Buffy* in terms of empowered sexuality and the presence of heteronormativity. However, while it is clear that the representation of female protagonists have attained a greater degree of diversity in *Orphan Black*, it is difficult to identity clear boundaries by which to assess the feminist value of these characters. The Girl Power motif is present in both shows, an element of its feminist potential realized with the series' emphasis on collectivity.

183. Feasibility of Integrating Tripterygium wilfordii into Modern Cancer Therapy for Increased Efficacy and Minimal Toxicity

Andy Vo, Dept. of Biomedical Engineering, with Prof. Mary Boyes, VCU Honors College

Cancer is the second leading cause of death in the U.S. and millions of new cancer cases are being diagnosed each year. While chemotherapy and ionizing radiation are effective treatments against these malignant tumors, the adverse effects that accompany such treatments are devastating. In order to find alternative treatment methods with less side effects, we turn to Eastern herbal medicine. Recent scientific research have found that *Tripterygium wilfordii*, an herbal medicine traditionally used to treat inflammation in China, contains compounds (triptolide and celastrol) that prevent the growth of solid tumors, induce apoptosis, and prevent metastasis of developed tumors. Investigations on these compounds on various cancer cells lines (*in vitro* and *in vivo*) have revealed some information about their mechanism, mode of action, and toxicity. In order to circumvent the potentially fatal side effects of triptolide and celastrol, it was proposed that roots of *T. wilfordii*, from which the compounds are extracted, be used a treatment for cancer. Methods for testing the efficacy and toxicity of the roots on the different cell lines previously studied are outlined in this paper. If

the results from the proposed experiment betray expectation, then future studies on combination drugs using triptolide and celastrol with other non-bioactive compounds within the roots should be done to develop a new anti-cancer drug with low toxicity.

184. When Americans Dueled

Jesse Adcock, Dept. of Mass Communications, with Prof. Faye Prichard, VCU Honors College

Dueling is the honor ritual wherein two individuals agree on a place and time to attempt to murder one another. I studied historical accounts, and modern day analyses of the practice, because while it sounds medieval and barbarous, American society is only a century and some change away from the practice. It was socially acceptable to break the number one moral rule of our society, and on that account is worthy of study. I sought the origins of American dueling, what function it served in American society, and where it went, and what caused it to go, and wanted to answer the question: Did dueling serve as an adequate arbiter of conflict in American society, or perpetuate it and how? I found two historical accounts, sermons, viciously preaching against deprecating its role while five other analyses of the period that cited testimonies of the day that were both for and against the ritual. I also studied two opposing analyses of the chivalric/antebellum era concept of honor, and a study on the motivations of the Hamilton-Burr duel. Dueling was a reaction to a developing American political system, where parties were more cults of personality than structured ideologies, and a defense against defamation of character in a time where one's reputation was a primary source of power, politically, economically and socially. It was not easy to demonstrate one's honor, and therein one's suitability for public office and prospective business, and the duel proved to be the ultimate statement where putting one's life on the line proved the authenticity of one's character, and cemented society's view of it. There are no real statistics on the casualties of dueling, because the majority went unreported and escaped into myth, however many of these myths have real events at their heart, and deserve to be studied to find the real extent of the ritual. Thousands of men, and not a few women, were murdered and the rule of law seemed to be given to the exception that it was necessary, and should be studied and understood, so it can be prevented.

185. Who Should Carry the Condom? An Analysis of Marketing on Gender Roles in the Contraceptive Industry.

Aine Waller, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

I am studying advertisements surrounding contraceptives in the United States to examine how gender marketing influences the sales of such products on males and females in order for my reader to understand how the media shapes and perpetuates gender roles on expected safe sex responsibility. Gender differences have long been present in American culture and have become more apparent in advertising with the allowance of direct-to-consumer (DTC) marketing. Allowing for the development and growth of gender marketing, DTC marketing is a prevalent advertising technique in the contraceptive industry. While previous studies have shown this technique relies on and perpetuates gender bias already established in society, little research has been done on why this is perpetuating gender norms and how this impacts the expected roles of men carrying condoms and women using birth control in safe sex. This

analysis of literature examines the history of the contraceptive industry and how pharmaceutical politics, marketing, and societal norms shapes men and women's impression of different contraceptive products. Focus is also on in-store placement and the advancement of direct-to-consumer advertising to see how this influences product associations. Literature analysis and independent studies focusing on male and female reactions to different marketing techniques, various contraceptives, and the evolving contraceptive industry were used. It was found that marketing techniques target associations that are comfortable with each gender. For males, sensuality was targeted, and for females, knowledge and information was emphasized. This results in males and females becoming more secure with the specific products they were marketed, giving power to contraceptive advertisements to control what products males and females generally use, determining gender norms in the societal contraceptive industry.

186. Vitamin D Deficiency in Urban North Indian Communities

Sudeepti Trivedi, Dept. of Psychology, with Prof. Mary Boyes, VCU Honors College

The high prevalence of Vitamin D deficiency in urban north Indian communities suggests that tropical climate and consistent sunlight does not ensure adequate amounts of Vitamin D. Religious factors, lack of national fortification programs, and inefficient awareness of the deficiency contribute to the scope of this epidemic across the nation and especially in the urban north Indian communities. The purpose of this literature review is to identify the primary socioreligious and cultural factors that contribute to the widespread presence of the Vitamin D deficiency and explain why previous attempts at treating this epidemic have been ineffective. Through comprehensive review of several public health articles and journals, many of the cultural factors were identified and then linked to the root cause of the deficiency within these communities. Religious factors such as the vegetarian diet and conservative choice in clothing limit the daily intake of Vitamin D. The increased time spent indoors during the workday and schooldays also contributes to the prevalence of the deficiency. Fortification programs in the past have been ineffective because of the state-by-state government system in India. Small-scale pilot programs were implemented in some states but were unable to gain popularity. In order to alleviate the extent of the Vitamin D deficiency, staple foods in the urban north India communities such as milk and wheat flour should be fortified with Vitamin D. Increased awareness of the epidemic must also be implemented through more advertising, health seminars, and campaigns.

187. Can You Please Put Your Phone Away?: Exploring the FOMO phenomenon, mobile addiction, and their effect on relationships

Laila Chaudhry, Dept. of Psychology, with Prof. Faye Prichard, VCU Honors College

This study attempts to identify how attachment to social media as well as attachment to other forms of communication technology can lead to addiction to mobile devices and affect non-virtual interpersonal communication. I examined the phenomenon known as the fear of missing out, or FOMO, which can be defined as apprehension that others might be having rewarding experiences from which one is absent. Experiencing FOMO can lead to overuse of and even addiction to social media, another category I examined, because addicted individuals want to stay more up-to-date with social networks and social media is the most efficient way to do so. This, by default, also connects to overuse of mobile devices due to ease of access with mobile social networking applications. This addiction is linked to loneliness and depression in and of itself, but the general overuse of mobile devices also has negative effects on

interpersonal face-to-face communication, the final category that I researched. Numerous studies showed that the use or even mere presence of a mobile phone decreased interpersonal trust in conversation partners. Therefore it can be inferred that excessive social media use can lead to loss of non-virtual connections. Further research into the psychological impact of virtual communication addiction is needed to explore these incredibly new phenomena and help to prevent addiction and negative associations with new technologies.

188. Analysis of AED treatment used for individuals with Rett Syndrome who experience seizures

Harshita Nangunuri, Dept. of Bioinformatics, with Prof. Mary Boyes, VCU Honors College

Rett Syndrome (RTT) is a severe Autism Spectrum disorder affecting one in ten thousand females. Seizures are a common symptom associated with RTT, as up to eighty percent of individuals with RTT have seizures. Most of these individuals are treated for these seizures with antiepileptic drugs (AEDs). However, AEDs are not very effective for treating seizures in all cases, have many side effects such as increasing the risk of vitamin D deficiency for individuals with RTT and do not help with any other symptoms associated with RTT. Because of these problems associated with AEDs, two additional treatments to treat seizures in individuals with RTT are proposed from analyzing and synthesizing the results and conclusions of relevant research articles. A diagnostic tool to identify the effectiveness of the two additional treatments mentioned was created and utilized. RTT is caused by a mutated methyl CpG binding protein 2 (MeCP2) gene, which produces the MeCP2 protein. The MeCP2 protein regulates the brain-derived neurotrophic factor (BDNF) gene and hence the BDNF protein, which also plays a role in RTT. The mutation in the MeCP2 gene results in decreased amounts of the MeCP2 protein and hence decreased amounts of the BDNF protein in the brains of individuals with Ret Syndrome. Increasing the amount of BDNF present in the brain and increasing the amount of MeCP2 present in the brain can be more effective for treating seizures in individuals with RTT. These two proposed treatments can potentially be given to individuals with RTT before symptoms such as seizures appear and help halt these symptoms from occurring. By using different treatment options or by developing treatments that can potentially halt the symptoms from becoming present can be extremely beneficial to individuals with RTT who also experience seizures.

189. Pain Management Tactics in the NFL

Varun Vishnubhatla, Dept. of Biochemistry, with Prof. Mary Boyes, VCU Honors College

Currently in the NFL, there exist a massive conflict of interest between physician incentives and player safety. Under the present bylaws, physicians are employed by the team and are treated as regular employees, often being given bonuses based on how they deal with player injuries and on their value to the team. Often times this leads to rushing players back from injury in order to play them before they are ready and subsequently, non-steroidal anti-inflammatory drug usage. Addiction to these NSAIDs and prescription opioids has become an issue in ex-players. A comprehensive survey and analysis of articles ranging from how injuries are handled in various sports around the world to the physiological body-response to injury has shown that there is a serious issue with how injuries are dealt with in the NFL. While there exists a stringent checklist of action for concussions and other mild traumatic brain injuries, there does not exist one for the prescription of painkillers for musculoskeletal injuries. An

oversight system is required if player safety is truly to be made a priority and this oversight system should not have any conflict of interest with the NFL or have any financial incentive to act in one direction or another.

190. Joining the Pow-Wow: The Catalyst for the Use of the Native American as Icon in the Emergence of Psychedelic Posters

Abigail Edwards, Dept. of Sculpture, with Prof. Mary Boyes, VCU Honors College

The counterculture of the 1960s in the United States developed as the tension evolved in the expansion of war in Vietnam and the civil rights movement, along with other social governmental issues of the decade. The art posters of the time embraced the concerns of artists and their desire to spread Native American ideals to a larger society. The artists of the time utilized a medium used in the past for propaganda, which had lost its resonance, and utilized the Native American as a moral icon instead of the militant icons of propaganda. The Native American became an icon through repeated stereotypes that continually lacked senses of individuality for the viewer to simply look to the icon as a figure of valuable beliefs.

191. Evaluation of TCP Header Fields for Data Overhead Efficiency

Justin Yirka, Dept. of Computer Science, with Prof. Faye Prichard, VCU Honors College

Bandwidth across the internet is constricted by monetary factors and hardware development, so researchers are left to improve the efficiency of data transmitted in order to improve internet speeds. The transmission control protocol (TCP) is the primary transport protocol on the modern internet, ensuring reliable delivery of the majority of data transmitted. I evaluated the TCP header fields for efficient use of data overhead so as to determine current waste and to suggest possible areas for revision. I examined original specifications for TCP mechanisms, comparing them to modern implementations as determined by updated standards and modern practices in the networking community, and considered the data overhead that header fields related to these mechanisms entail. Consideration of implementations included evaluation of frequency of use as well as necessity of use. Current inefficiency in the data overhead of TCP should be addressed, because many of the header fields are either clearly wasteful or would be more efficient alternatively implemented. Certain core features of the TCP header cannot be revised without drastic alterations to the protocol, such as the sequencing and acknowledgement numbers. Other features, such as the header checksum, are inherent to the integrity of the header. However, most fields are arguably inefficient, as they either are not a continuing necessity for TCP's function or they may be more efficiently implemented as TCP options. Further, several fields are no longer widely used, and are effectively totally wasteful. The proposed improvements to TCP overhead could result in a reduction of up to several bytes per segment transmitted. Admittedly, the savings of individual segments are only on the order of several bytes, which is a small percentage of most segments including payload. However, this small savings has the potential to result in savings orders of magnitude greater across the general internet. This potential suggests a need for further research into the viability of TCP header revision, followed by implementation of proposals. Results and methodologies used to reach these conclusions are additionally applicable to a variety of ongoing research (e.g., header compression, acknowledgement frequency reduction).

192. The Effects of Afghanistan War in the Breakdown of the USSR

Ezoza Nomazova, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

The collapse of the Soviet Union in 1991 was one of the biggest historic events of XX century. Much like the Roman Empire, the USSR breakdown was due to an aggregate of factors, some internal, and some foreign. Unlike, the Roman Empire, the Soviet Empire collapsed suddenly. Throughout history, scientists, historians and politicians have studied fallen empires to discover what went wrong. Among the reasons for the fall of the Union, the invasion of Afghanistan was one of the poorest decisions that was made by the Soviet government. What factors did this event contribute to the fall of the USSR? The Russian invasion of Afghanistan had big impact on the attitude of the developing countries and third world against Russia. And for years the Soviets were preaching that they were supporting the developing countries to maintain their freedom. However, when the USSR invaded Afghanistan, people found that Russia was not a reliable ally. The same way Soviets invaded Afghanistan they could invade any country as well. The occupation of Afghanistan caused irreversible internal conflicts between the Soviet republics and the Soviet government. By the time Mikhail Gorbachev took position of general secretary in Community Party and ordered the Red Army to withdraw from Afghanistan, the economic and military resources for the invasion were drained. The paper examines the negative consequences of the war. Theoretical and methodological basis of the study were the government documents. Sources of information for writing the paper on the effect of the Afghan war on the Soviet breakdown were the educational literature, fundamental theoretical works of the professionals in the area, results of empirical research of prominent domestic and foreign authors, articles and reviews in specialized publication and periodicals devoted to the topic. Four following categories were identified as the effects of the war: domestic conflict, economic crisis, political situation, and military confrontation. The analysis exposed a number of issues and controversies relevant to the topic at hand, and the further study is required in order to figure out whether it could have been achieved to save the USSR.

193. Celebrity Impact on Disease Research Funding and Public Perception of Diseases

Joseph Gonnella, Dept. of Forensic Science, with Prof. Faye Prichard, VCU Honors College

Funding for disease research is crucial in determining possible treatments and cures for certain diseases. The money for basic science research, clinical trials, and pharmaceutical applications takes extraordinary amounts of money, and the total number of diseases that affect humans is large. Celebrities who are personally affected by certain conditions or diseases often become spokespeople to raise awareness and funds to help find treatments and cures. This raises the question of how much of an impact celebrities have on the allocation of funding for disease research and how much a celebrity's endorsement affects the public's perception of those diseases. By researching articles from peer-reviewed journals such as *The Journal of the American Medical Association*, I found that there is a direct correlation between when a celebrity speaks out on behalf of the disease and the subsequent increase in funding and positive, public awareness. For instance, Magic Johnson used his celebrity status as a basketball superstar to change the country's attitude towards AIDS, causing a significant increase in AIDS funding. Another example of this was when Nancy Reagan, the First Lady at the time, became a proponent for breast cancer options and awareness. Celebrities have the unique platform to achieve support for their causes because they are already in the national spotlight and many of them are revered. It then follows that their causes are worthy and should be supported and accepted as well. Conversely, many diseases that do not have a

celebrity endorser receive less funding and little public awareness. Therefore, finding the most effective way to distribute the money and funding to research teams for all diseases would be the next step.

194. Preadolescent and adolescent girl's self-image in relation to similar female faces in animation

Kelsey Morrison, Dept. of Communication Arts, with Prof. Faye Prichard, VCU Honors College

Recently, there is an overwhelming amount of effort put into improving girls and women's self-images, from antagonizing incredibly thin fashion models to making an anatomically and proportionately correct doll with acne and cellulite stickers. However, very little attention is put on the face. Over years of watching animation, I noticed that female faces tended to have very similar facial features. The facial similarity in female characters portrayed as attractive, most often in animations aimed at preadolescent and adolescent girls, could possibly lead to the belief that only one facial type is attractive, leading to any girl not with those features to have lower self-image. Desiring to look into this gap of information, I aimed to look into how the similarity in facial features of female characters in animation aimed at preadolescent and adolescent girls affected the target audience's self-image, if it does at all. To find out, I first looked into studies to see what children and adults considered attractive in female faces to see if it matched with how female faces are portrayed in animation. I also looked into studies that showed how animation displayed messages about attractiveness, and possibly influenced or enforced people's perceptions of attractiveness after repeated exposure. Furthermore, I looked at articles and studies relating to the development of children's self-image in relation to animation One study even showed that children and adults are likely to treat animated avatars or characters similarly to real people. I also conducted a small personal study to tentatively determine if the facial similarity in animation exists. Based upon the research, there is a high chance the facial similarity of female animated characters could influence preadolescent and adolescent girl's self-image. To further affirm the findings here, an official study to demonstrate the presence of facial similarity in animations aimed at preadolescent and adolescent girls is needed. Also, a more direct study to display the correlation between animations and perceptions of ideal facial features should be researched.

195. Disordered Eating from Interpersonal Relationships and Body Comparisons

Taylor Dawson, Dept. of Theater, with Prof. Faye Prichard, VCU Honors College

According to the National Eating Disorders Association, 20 million women suffer from an eating disorder at some point in their lives. The purpose of this paper is to discuss how women's relationships (with sisters, mothers, female friends and significant others) along with thin ideal media shape beauty ideals and contribute to eating disorders. I studied scholarly articles pertaining to exposure to underweight and healthy weight models and its effect on women. I also examined articles that discussed different types of comparisons that women made on themselves against the female figures in their lives. I examined studies on parental disordered eating and perceived body image. My preliminary conclusion is that women's comparisons in their interpersonal relationships have more of an effect on disordered eating and beauty ideals than thin ideal media. To help with the low self-esteem that creates these negative comparisons, girls should be raised and encouraged to develop a high image of self, but more

research is needed on body comparisons to find a way to affectively and successfully correct these negative comparisons with accuracy.

196. The Effect of Westernization on Prevalence of Diabetes

Julia Hara, Dept. of Biology, with Prof. Mary Boyes, VCU Honors College

I am studying the westernization of diet (increased iron intake) in Japan because I want to find out how westernization affects the prevalence of type II diabetes in Japanese people in order to help my readers understand how westernization has led to weakened β-cell function and insulin resistance—two factors that play a part in the development of type II diabetes. Japanese people are typically thought to lead long, healthy lives due to stereotypes in their diets. A traditional Japanese diet mainly includes unprocessed, fresh foods, high amounts of fish and soy protein, and vegetable products. In other words, traditional Japanese people follow low-fat, low-protein, and high-complex-carbohydrate diets. After World War II, Japan was revolutionized by western culture. Many Japanese people either moved to western countries in North or South America, or were swept up in the wave of western influence that permeated Japan. Westernization greatly affected diets. With westernization, many Japanese people began consuming higher animal fat and protein diets. Simultaneously, the rate of prevalence of type II diabetes increased in Japanese people. Westernization is one cause of the increase. Numerous studies posit that heme iron found in red meat is associated with increased risk of type II diabetes when combined with higher amounts of fat. Because Japanese people began consuming more red meats and more animal-based fatty foods after WWII as a product of westernization, the rate of type II diabetes jumped. Many others were put more at risk for developing type II diabetes. This increase was especially prevalent in Japanese people who moved to the United States. Heme iron, found in red meat, causes iron overload in pancreatic β-cells, which damages insulin secretion. Additionally, increased fat consumption greatly reduces insulin resistance. Combined with the fact that Japanese people genetically have weaker insulin secretion in comparison to Caucasians, westernized diets put Japanese people at a much higher risk for developing type II diabetes.

197. Correlation between childhood overexertion from playing in competitive year-round baseball and Tommy John surgery

Zachary Philippi, Dept. of Biology, with Prof. Faye Prichard, VCU Honors College

The incidence of ulnar collateral ligament (UCL) reconstruction, or Tommy John surgery, is increasing for baseball players, especially at the high school level. Early single sport specialization in youth players is concomitantly rising with UCL injuries. Parents and coaches are pushing children to extreme measures, resulting in players engaging in year-round repetitive and intense activities. To understand the reasons behind the increase in Tommy John surgeries, I studied the effects of overuse and year-round playing on the maturing body, to help understand adolescent elbow injury prevention. I examined studies of risk factors for arm injuries and the effect of arm overuse on adolescent athletes and their arm health in sports medicine, sports health, and orthopedic journals. With the rise in sport specialization, players are playing for multiple teams with overlapping seasons. Compounded microtrauma from playing excessive baseball adds risk for arm injury and can lead to UCL reconstruction. Furthermore, many young players overexert themselves during the season, leading to arm fatigue, chronic pain, and arm ligament overload. Although numerous coaches and parents recommend not throwing curveballs at young ages, there is no significant correlation between throwing curveballs and elbow injury. More research will need to be done to further

demonstrate a clear connection between year-round baseball and UCL injury, as it is clear the increase in Tommy John surgery is due to a combination of factors. Nonetheless, arm overuse plays a key role in UCL injury and prevention is necessary to reduce adolescent elbow injury in baseball. Although many players can return back to playing competitive baseball following the procedure, prevention is ideal so players do not have to endure the long recovery process. Poor pitching mechanics should be corrected and players should not pitch more than 100 innings per year. Players, parents, and coaches should stay educated about injury risk factors and should follow pitch count guidelines, allow adequate rest throughout the year, restrict throwing on consecutive days, and restrict pitching with arm fatigue and pain.

198. An Analysis of the Utility of Cone-Beam Computed Tomography to Clinical Dentistry

Alan Booth, Dept. of Chemistry, with Prof. Faye Prichard, VCU Honors College

Cone-beam computed tomography (CBCT) is an imaging technique that generates three-dimensional models. Due to recent reductions in the cost of CBCT devices, this technology has become available to dentists, who use it for locating oral structures, such as the inferior alveolar nerve or impacted teeth, in a three-dimensional space. CBCT is suspected to improve the accuracy of clinician' pre-operative diagnoses. I therefore studied the advantages and limitations associated with the use of CBCT to determine whether the technology sufficiently improved treatment quality to justify its increased cost and radiation dosage relative to conventional radiography (CR). I researched articles on the clinical use of CBCT in the fields of dentistry most affected by the increased access to this technology including implant dentistry and orthodontics. I also analyzed articles on the radiation dosage associated with CBCT operation. A review of articles concerning the operating costs of CBCT completed the analysis. Despite arguments that CBCT systems allowed for more accurate placement of implants and therefore increased rates of implant success, tomograms produced with CBCT were found by Guerrero et al. to not notably affect clinicians' pre-operative treatment planning for implant surgeries when compared to CR. CBCT was of use in orthodontic treatment, however, because the improved quality of the resultant tomograms relative to CR provided information on oral conditions beyond just tooth location. Radiation dosage associated with CBCT ranged from 4 to 15 times that associated with panoramic and conventional radiography. The as-low-as-reasonably-achievable approach therefore guides the decision to use CBCT as an alternative to CT, instead of as a replacement for CR. A framework for determining CBCT costs of operation was identified, however variations in the cost of operation across healthcare systems prevented any real analysis. The use of CBCT in a clinical environment does not therefore appear to be justified by the supposed benefits associated with treatment. CBCT devices should not be recommended to clinicians, because they offer no advantages over treatment using traditional CR systems. Further research is warranted, however, as CBCT usefulness will vary with specialty.

199. Bees In The Trap

Daniel Jernigan, Dept. of Sculpture, with Prof. Faye Prichard, VCU Honors College

Honey bee populations around the world have plummeted and continue to plummet. A mysterious phenomenon, known as colony collapse disorder, leaves hives vacant except for unborn brood. This is disturbing and has prompted me to ask what will the ramifications of honey bee extinction be, in light of the development if the robobee? To understand this I analyzed a meta analysis on pesticide effects on honey bees. I also reviewed a paper focusing

on a mathematical model for colony collapse, another about how tree-lined streets in rural Europe can be used as bee habitats, an article written by the developers of the robobee, a paper explaining how the robobees will be controlled, an article examining moral complications of drone warfare, and an article about drone privacy violations. All of this information has lead me to the following conclusions. Forager bee death rate is the primary factor of CCD and neonoctinoid pesticides have profound nuerotoxic effects on forager bees, making these chemicals the primary cause of CCD. Robobees will be in the air within the next ten years. They will perilously replace nature endangering our spices and all life on this planet. Their operators will have no empathy to their actions because of the type of visual sensing they will use. They will violate privacy. The problem of mass bee death must be solved, not ignored.

200. Evaluating Exercise as a Viable Treatment for Alcohol Addiction and Abuse

Minh Doan, Dept. of Biomedical Engineering, with Prof. Faye Prichard, VCU Honors College

Long term alcohol abuse or the consumption of ethanol can potentially lead to several detrimental effects on the nervous, respiratory, and digestive systems, while at the same time causing severe depression, anxiety, and irritability. However, these side effects still do not deter alcohol abusers due to short term stimulation of the nervous system, which is caused by the stimulation of the dopamine reward pathway. Exercise also activates dopamine reward pathways, indicating that exercise can be used to achieve a similar euphoric effect and be used in substitute. I am studying how exercise can be used to treat alcohol abuse in order to see if it can be implemented as is a viable treatment option. I examined articles that first studied how alcohol affects the neurological system and the side effects it induces. Then I analyzed articles that discussed how exercise affects the same neurological pathways that were stimulated by ethanol consumption. I also analyzed articles that incorporated exercise with alcohol consumption, with limited success. Finally, I analyzed articles that studied how effective exercise treatments are in patients with mental illnesses and other addictions, and whether or not it was a viable treatment option. I found that alcohol addiction activates several different reward pathways including dopamine pathways, cytokine pathways, as well as releasing opiates. The side effects of mental illnesses can be mediated by exercise, because exercise can act as a substitute and decrease the severity of withdrawal effects by activation of the dopamine reward pathway and build confidence, which most people with mental addictions lack. However, people who have mental disorders involving mental illnesses or OCD are more prone to exercise addiction, and treatment by exercise could actually be harmful. There are also many external factors that limit the viability of exercise as a treatment such as cost, availability, and pre-existing physical limitations. In conclusion, exercise as a standard treatment option for alcohol abuse is nonviable because several external factors limit the accessibility of this treatment method. However, exercise can be used to mediate the effects of alcohol abuse by activating similar reward pathways, which can reduce the withdrawal effects.

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