

Fall 2021

## 4th Annual Fall Undergraduate Research Symposium

West Virginia University



West Virginia University  
OFFICE OF UNDERGRADUATE RESEARCH

# 4th Annual FALL UNDERGRADUATE RESEARCH SYMPOSIUM

**Saturday,  
December 4, 2021**

**Poster presentations**

(1 to 3:00 p.m. Ballroom - Large Blue)

**Oral & Performing Arts  
presentations**

(3 to 6:00 p.m. Monongahela and Laurel Room)

**Mountainlair,  
1550 University Ave.**

<https://undergraduateresearchsymposia.wvu.edu/>

## **I. SCHEDULE OF EVENTS**

Saturday, December 4, 2021

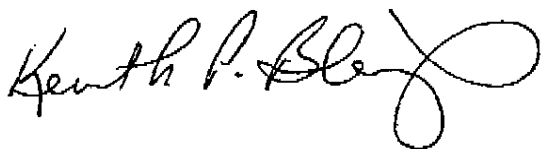
Location: Mountainlair, 1550 University Avenue, Morgantown, WV

1:00 to 3:00 p.m.	Poster presentations:	MSU Ballroom - Large Blue
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3 to 6 p.m.	Oral presentations:	MSU Laurel Room
		MSU Monongahela

## **II. LETTER FROM THE DEAN OF THE HONORS COLLEGE**

Greetings. I am excited for today's undergraduate research symposium. The scholarly work represented here highlights the efforts of WVU's best and brightest undergraduate students. I applaud the extra effort of the students who carry out the work and thus are enriching their undergraduate education. I have no doubt that their investment of time and effort will reap dividends for years to come as has my own undergraduate research experience. Also, it is all together fitting to extend my appreciation to all those that have mentored these undergraduate students through this scholarly work. I trust you have grown as a mentor and that you have found the work rewarding as well. Best wishes for a great symposium.

A handwritten signature in black ink, reading "Kenneth P. Blemings". The signature is fluid and cursive, with a large loop at the end.

Kenneth P. Blemings, Ph.D.  
Dean of the WVU Honors College  
Professor of Nutritional Biochemistry

### III. ACKNOWLEDGMENTS

#### A. Undergraduate Presenters and Faculty Research Mentors

We want to take this opportunity to thank our undergraduate presenters. This year, we welcome presenters from the Research Apprenticeship Program, the Honors EXCEL Program, the Beckman Scholars Program, and other undergraduates doing research at WVU to share their research and creative efforts. In addition, special thanks to our faculty research mentors. We know that involving students with limited research experience takes additional effort, and for this we are grateful. We highly value the mentorship you are providing to student researchers and your promotion of a culture of strong undergraduate research at WVU.

#### B. Personnel

##### RAP

Cynthia Pacheco – Director  
Paige Zalman – Program Coordinator  
Carinna Ferguson – Graduate Teaching Assistant  
Morgan Simpson - Graduate Teaching Assistant  
Stephanie Augustine - Graduate Teaching Assistant  
César Castellon Gort – Graduate Teaching Assistant  
Cassidy Kidwell - Undergraduate Teaching Assistant  
Michael Fiala - Undergraduate Teaching Assistant  
Kallie Schafner - Undergraduate Teaching Assistant  
YJ Arciaga – Undergraduate Teaching Assistant

##### Office of Undergraduate Research

Amy Hessel - Director  
Cynthia Pacheco – Assistant Director  
Kevin Walden - Coordinator  
Paige Zalman - Coordinator

#### C. Financial Support

##### Beckman Scholars Program

Funding provided by the [Arnold and Mabel Beckman Foundation](#).

The Beckman Scholars Program provides in-depth, sustained undergraduate research experiences for exceptionally talented, full-time undergraduate students.

**Louis Stokes STEM Pathways and Research Alliance: KY-WV LSAMP** (WV PI: David Miller).

Funded by NSF the KY-WV LSAMP is a consortium of colleges and universities working together to create, enhance, and expand programs designed to broaden participation and increase the quality and quantity of students from underrepresented populations who receive degrees in STEM disciplines. One of its focus is undergraduate research experiences. Eligible students are supported to do research in RAP.



**First2 Network**: Initiative funded by NSF that aims to increase the persistence of STEM students in their majors, particularly first-generation WV students. Eligible students are supported to do research in RAP.



**Federal Work Study**: A federal student aid program that provides part-time employment while students are enrolled in school to help pay their education expenses. The program encourages work related to the students' course of study, including research.



#### **IV. SYMPOSIUM JUDGES**

Alex Crum  
Alexa Sowers  
Amanda Chappell  
Amir Tavakoli  
Anna Korol  
Bernardo Martinez  
Brandi Binkley  
Briana Clary  
Brianna Skaff  
Brittany Hughes  
Caitlin Mickles  
Cassie Lamb  
Claire Kisamore  
Courtney Vander Pyl  
Daniel Panaccione  
Derek Maloney  
Erin Jordan  
Graham Daskoch  
Heather Chaney  
Jaclyn Kitts  
Jacob Feldmann  
Jacqueline Fannin  
Jerry, Murphy  
Jiangmei Yuan  
Jignesh Solanki  
Joanna Ridgeway  
Katya Nolder  
Kelsey Bentley  
Krystal Hughes

Lupe Davidson  
Mackenzie Miller  
Madison White  
Margaret Childers  
Megan Nielson  
Melissa Sherfinski  
Michael Jones  
Montana Williamson  
Morgan McMinn  
Nagasree Garapati  
Nathan van Vranken  
Nicholas Winch  
Olivia Lohman  
Polina Krom  
Rhiannon Macom  
Samuel Ogunfuye  
Sara Crayton  
Sara Druffner  
Steven Frisch  
Tasneem Arsiwala  
Terrence Pierre Jacques  
Vanessa Yerkovich  
Vlad Codrea  
Yang Yang  
Yea Won Park  
Yuhe Tian  
Yves Mbous  
Zoe Pagliaro



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**4th Annual**  
**FALL UNDERGRADUATE**  
**RESEARCH SYMPOSIUM**

**Schedule of**  
**Presentations**

**Mountainlair,**  
**1550 University Ave.**

<https://undergraduateresearchsymposia.wvu.edu/>



**4th Annual  
FALL UNDERGRADUATE  
RESEARCH SYMPOSIUM**

**Poster  
Presentations**

**MSU Ballroom - Large Blue  
Saturday, December 4  
1 to 3 p.m.**

**Mountainlair,  
1550 University Ave.**

## Physical Sciences & Engineering (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Victoria Blanton	1	Physics	D.J. Pisano	Testing the DSPIRA Radio Telescope's Ability to Detect H1 and Create Maps
Kasey Blankenship	2	Civil Engineering	Roger Chen	The Development of Performance Specification for Concrete Containing Ground Granulated Blast Furnace Slag
Michelle Wunder	3	Biology	Justin Legleiter	External Factors Impacting the Aggregation of Proteins Associated with Huntington's Disease
Lillian Bischof	4	Chemical Engineering; Finance	Fernando Lima	Modeling of West Virginia Solar and Wind Power Plants Using the System Advisor Model
Kevin Donnelly	5	Chemical Engineering	Nagasree Garapati	Solar, Wind, and Thermal Storage Integration in North-Central West Virginia
Nathanael Wimer	6	Mechanical Engineering	Konstantinos Sierros	Flexible & 3-D Printable Batteries for Practical Application

## Biology, Biochemical & Environmental Sciences (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Teagan Kuzniar	7	Environmental Microbiology	Ember Morrissey	Temperature, Oxygen, and Vegetation as Drivers of Microbial Dynamics in Warming Boreal Peatlands
Logan Woodburn	8	Biology	Timothy Driscoll	A Comparison Between Covid-19 Case Data and Wastewater Signal in K-12 Schools
Jessica Burke	9	Biology	Edward Brzostek	Genetically Engineered Bioenergy Cane Suppresses Microbial Activity and Reduces Soil Carbon Losses
Jillian Goodrich	10	Biology	Timothy Driscoll	Distribution of Tick-Borne Pathogens in Black-Legged Ticks of West Virginia
Sydney Friend	11	Animal and Nutritional Sciences	Teiya Kijimoto	The Function of the Sex Determination Pathway in the Development of Beetle Horns
Sarah Potter	12	English	Bonnie Brown	Tokata Iron Eyes, Her Heritage, and How that Informed Her Actions at Standing Rock
Shelby May	13	Neuroscience	Sadie Bergeron	Examining the Link Between Gsx1 and Efnb2a Expression in the Zebrafish Visual System
Lauren M. Bish	14	Biochemistry	Daniel Pannacione	Genetic Analysis of the Final Steps in Lysergic Acid Amide Synthesis
Abigail Jones	15	Biochemistry	Daniel Pannacione	A Novel Gene Associated with the Ergot Alkaloid Pathway
Emery A. Kronemeyer	16	Biology	Sadie Bergeron	Examining Polymerase Chain Reaction Fundamentals Through Genotyping Mutant Zebrafish Lines

## Health Sciences & Community Health (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Christopher Kenney	17	Biology	Brian Boone	Outcomes of Newly Trained Robotic Surgeons Suggest Safe Implementation at an Academic Institution
Abigail Baker	18	Industrial Engineering	Scott Galster	Examining the Trends in Intra-Session Heart Rate Variability During Float-REST and Dry Float Modalities
Axel Schon	19	Biomedical Engineering	Scott Galster	Lower Body Joint Mechanics Following Anterior Cruciate Ligament Injury in Elite Female Soccer Players
Max Bingman	20	Neuroscience	Jennifer Liu	Reducing Blue Wavelength Lighting Ameliorates Infarct Deficits Caused by Dim White Light at Night
Ali Albowaidey	21	Immunology and Medical Microbiology	Zachary Weil	Traumatic Brain Injury Exacerbates Ischemic Stroke Outcomes
Abigail Rider	22	Biochemistry	Kevin Larkin	Big 5 Personality Type Correlation to Nicotine Addiction
Hannah Smart	23	Neuroscience	Wanhong Zheng	Safety and Efficacy of Buprenorphine Plus Naloxone for Pregnant Women and Newborns
Isabella Balko	24	Biology	Pavithra Ellison	Incidence, Prevalence, and Outcomes of Pediatric Trauma in Rural Appalachia From 2017 to 2019
Alexandra Benyola	25	Neuroscience and Psychology	Scott Galster	Determining the Effects of a Weighted Blanket in the MRI Environment
Madison R. Robinson	26	Exercise Physiology	Mark Olfert	Single Vape Exposure on Middle Cerebral Artery Function Over a 72-hour period
Emily R. Dumford	27	Forensic Examiner	H. Wayne Lambert	Preventing Iatrogenic Injury to the Dorsomedial Cutaneous Nerve of the Hallux
Allison J. Hess	28	Biology	H. Wayne Lambert	Bilateral Discovery of the Fibulocalcaneus Externum Invertus: A novel Fibularis Quartus Variant.

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Kendra Wolford	29	Exercise Physiology	Michael Robichaux	Visualizing Photoreceptor Cilia in the Retinas of Scorpion-GFP Transgenic Zebrafish
Duncan McGee	30	Biomedical Engineering	Mark Tseytlin	3D Bioprinting a Model Artery with FRESH Bioprinting
Alexandra Dickey	31	Biology	Julie Brefczynski-Lewis	Short-term Behavioral, Physiological, and Brain Differences in Real Life and Virtual Reality Social Interactions
Ava Koontz	32	Immunology and Medical Microbiology	Charles Anderson	Synaptic Zinc's Effect on how the Neurons in the Auditory Cortex Respond to Sound
Saif Abbas	33	Biomedical Engineer	Valeriya Gritsenko	Quantifying the skill of Robotic Surgeons Using a Biomechanical Method of Assessment
Madison Seman	34	exercise physiology	Evan DeVallance	Hepatic Xanthine Oxidoreductase Upregulated by Nano-Titanium Dioxide Exposure
Gwendolyn Dzwil	35	Public Health	Linda Alexander	Associations Between Child COVID-19 Vaccine Uptake and Medical Mistrust among Black/African Americans
Elijah Smith	36	Exercise Physiology (Health Track)	Lori Sherlock	Comparative Health Benefits of Reduced Exertion High Intensity Interval Training with an Aquatic Emphasis
Phillip Englund	37	Exercise Physiology	Paul Chantler	Chronic Stress Increases the Production of Xanthine Oxidase in the Liver of C57BL/6J Mice
Aliyah Lada	38	Exercise Physiology	Sergiy Yakovenko	Passive Stride-Length Limiting Orthosis Cause Gait Asymmetry and Sensorimotor Adaptation in Humans
Grace Udah	39	Public Health	Robert Bossarte	The Appalachian Mind Health Initiative.
Nisa Rana	40	Biology	Valeriya Gritsenko	Developing Virtual ARAT Rehabilitation Tasks and Assessing Performance in Virtual vs Real Environments
Alexandria Lusk	41	Exercise Physiology	Evan DeVallance	Nano-Titanium Dioxide Inhalation-Induced Oxidant Production Associates with Placental and Pup Insufficiencies
Morgan J. Glass	42	Biochemistry	Paul Lockman	Understanding Radiation's Potential in Drug Delivery Across the Blood-Brain Barrier.

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Cameron Johnson	43	Management Information Systems	Steven Frisch	The Regulation of Interferon Signaling and Viral Replication by GRHL2
Bryan Hill	44	Anthropology and History	Susanna Donaldson	Cultural Knowledge and Perception of Cancer and Cancer-Healthcare Among Residents of Rural West Virginia

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### Social & Behavioral Sciences (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Matthew Witkowski	45	Communication Studies	Christine Rittenour	Exploring Sibling Communication
Kathryn Roe	46	Music Therapy	Hannah Ivey-Bush	Environmental Music Therapy to Support Healthcare Professionals: A Response to Increased Burnout During Covid-19
Gabrielle McDonald	47	Psychology	Cheryl McNeil	Comparing Pre-Treatment Compliance Rates Between PCIT and PCIT-Toddler Using DPICS
Ladimir Garcia.	48	Journalism	Julia Fraustino	Literature Review on HPV Vaccine Perceptions Among Hispanic Populations
Amelia Godwin	49	Psychology	Cheryl McNeil	Associations between Parenting Factors and Instances of Physical Touch with Toddlers
Nicholas Hatcher	50	Biology	Cheryl McNeil	Parent Emotion-focused Practices and Child Emotion Regulation in PCIT with Toddlers
Emily Aman	51	Neuroscience	Cheryl McNeil	Joint Engagement in Children with Autism Spectrum Disorder after First Phase of PCIT
Amina Boukhris	52	Psychology & Biology	Claire St. Peter	Varying Quality of Attention Impacts Student Hand Raising: A Single-Case Evaluation
Jessica Benevides	53	Psychology	Claire St. Peter	Differential Reinforcement of Hand Raising Also Reduces Talking Out in Classrooms
Alik Assi	54	Neuroscience	Mariya Cherkasova	The Effects of Reward-Related Sensory Game Features on Simulated Online Gaming
Ethan Schneider	55	Psychology	Kennon Lattal	Resurgence on Conditioned Behavior
Katheryn Hetman	56	Nursing	Roger Carpenter	The Effects of Mothers Substance Use Disorder on Neonates
Sarah Smith	57	Child Development and Family Studies and MDS	Kristi Wood-Turner	The Impact of the COVID Pandemic on Survivors of Violence

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Ashley Sheree	58	Sociology	Jennifer Ludrosky	Distance to Care Analysis: Determining Accessibility of Children's Mental Healthcare in Rural West Virginia
Carmen Thomassy	60	Psychology	Michaela Clark	Observing and Measuring Behavior in Persons with Dementia Using the Greater Cincinnati Well-Being Tool

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**4th Annual  
FALL UNDERGRADUATE  
RESEARCH SYMPOSIUM**

**Oral  
Presentations**

**Laurel and Monongahela  
Rooms**

**Saturday, December 4**

**Session 1: 3 to 4:30 p.m.**

**Session 2: 4:30 to 6:30 p.m.**

**Mountainlair,  
1550 University Ave.**

## Science & Technology (Oral Presentations)

### Laurel Room: Session 1

3 to 4:30 p.m.

Logan Yokum	62	Cybersecurity	Thomas Devine	Pentesting Capture the Flag Activities on Virtual Machines
Yssabela Cabuyao	63	Neuroscience	Utkarsh Kohli	3p Deletion Syndrome Case Report and Review
Trevor Smith	64	Mechanical and Aerospace engineering	Yu Gu	Gemini Telepresence Robot System Design
Oscar Enriquez	65	Forensics	Tina Moroose	Next-Generation Sequencing: The Future of Forensics
Jessica Friedel	70	Forensic Chemistry	Tatiana Trejos	A Study of Gunshot Residue Prevalence in the General Population of Morgantown, West Virginia
Miles Nelson	71	Mechanical Engineering	Derrick Banerjee	Proposed Mechanism for Electrochemically- Controllable Synthetic Muscle Fibers

### Laurel Room: Session 2

4:30 to 6 p.m.

<b>Presenter Name</b>	<b>Presenter No.</b>	<b>Major</b>	<b>Faculty Research Mentor</b>	<b>Presentation Title</b>
Heather Rubilla	61	Animal and Nutritional Sciences	Jaelyn Current	Mare Reproductive Loss Syndrome
Bethany Knight	66	Biomedical Engineering	Karen Anderson	Effects of Aripiprazole and Amphetamine on Risky Choice in Rats
Madison Menendez	67	Neuroscience	Umer Najib	Treatments and Comorbidities of Migraines

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				in the Population of West Virginia
Kelly Hanlon	68	Animal and Nutritional Sciences	Scott Bowdridge	The Effect of Sheep Breed on Immune Cell Response to Lipopolysaccharide Stimulation <i>in Vitro</i>
Daniel Bryan	69	Wildlife and Fisheries Resources	Sheldon Owen	Muskrat Response to Olfactory Stimuli
Mackenzie Miller	72	Biology	Adrienne Williams	Inhibition of Cell Signaling Regulator microRNA-21 Hinders Glioma Neurosphere Tumorigenic Capacity

## Human Engagement (Oral Presentations)

### Monongahela Room: Session 1

3 to 4:30 p.m.

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Emma LaBombard	73	Accounting & MIS	Lauren Cooper	Stock Market Reactions to Deferred Tax Adjustments: The Effect of State Deferred Tax Deductions
Riana Bobes	74	Biology, Russian Studies	Lisa DiBartolo	Increasing of Global Awareness: With an Emphasis on Russian and Eastern European Culture
Bethanny Prascik	75	Anthropology and Dance	Travis Stimeling	The Evolution and Origins of Appalachian Dance
Aidan Connors	76	Philosophy	Scott Davidson	The Need for the Care of the Self in Education
Michael Duong	77	Creative Writing and Entrepreneurship	Timothy Sweet	How Poetry Can Influence Certain Voices in Martin Luther King Jr.'s Speeches and Papers

**Monongahela Room: Session 2**

**4:30 to 6 p.m.**

Elijah Kaznoski	78	History	Robert Blobaum	Neighbor Against Neighbor: How Politics and War Paved the Way to Anti-Semitic Violence (1914-1941)
Jada Taylor	79	Philosophy	David Hoinski	Autonomy and its Significance to a Good Life According to Spinoza and Kant
Keely Krueger	80	Multidisciplinary Studies	Elizabeth Oppe	The Importance of Utilizing Social Media for Non-Profit Organizations
Allison Berg	81	Spanish, English	Sonia Zarco-Real	Movement and Identity in Donato Ndongo's El Metro

**Presentation #1**

**Testing the DSPIRA Radio Telescope's Ability to Detect H1 and Create Maps**

**Victoria Blanton\* and D.J. Pisano, Ph.D.**

*Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26505*

**Broad category:** Sciences

**Presenter's major:** Physics

Radio astronomy is the study of celestial objects through the use of radio telescopes. Radio waves from these objects are detected by those telescopes and analyzed in computer programs developed to create organized visuals like graphs or maps of the data. Neutral hydrogen (H1) is one of the most abundant gasses in the universe and surrounds celestial objects. It can be detected to track the movements of these objects, in which H1 maps are made. A radio telescope following a guide created by astronomers as the Green Bank Observatory, NSF, and WVU was constructed to make H1 maps from the perspective of Earth. Materials totaled to a price under \$300 and are publically available. Some components of the telescope come as pre-built or have the option of self-construction. H1 maps created will be used to test the accuracy of the telescope so that it can be used for more widespread use. These maps will be used to study the movement of H1 in the night sky and help create predictions for future formations of stars in the Milky Way.

**Funding:** The National Science Foundation

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #2**

**The Development of Performance Specification for Concrete Containing Ground  
Granulated Blast Furnace Slag**

**Kasey Blankenship\*, Dr. Roger Chen, Ph.D., Guadalupe Leon, M.A., and Seyenavid Mardmomen, M.A.**

*Wadsworth Department of Civil and Environmental Engineering, West Virginia University, Morgantown,  
WV 26506*

**Broad category:** Engineering

**Presenter's major:** Civil Engineering

Concrete is an essential part of the foundational material that has helped build America; however, most are unaware of its many faults. Mass concrete is considered by the American Concrete Institute (ACI) Committee, to be any volume of concrete in which one must take extended measures to minimize inevitable cracking due to heat from hydration. The chemical reaction between the cementitious material and water, hydration, is exothermic. The heat liberated from this chemical reaction, or the heat of hydration varies depending on the type of cementitious materials. The issue with this is when builders have a high volume of concrete, due to concrete's low thermal conductivity, the heat does not dissipate therefore has a high internal temperature. During the early age, the thermal gradient between the inside and the outside can increase the cracking risks. To lower the heat of hydration, several waste materials can be replaced by Portland cement. Ground Granulated Blast Furnace Slag (GGBFS) is one of the most popular by-products (steel industry) that has been used as a replacement for Portland cement. The objective of this research project was to develop a performance specification for concrete containing ground granulated blast furnace slag. The specification will describe requirements for the early-age heat and strength. Furthermore, the ideal percentage of Portland cement replacement to maximize strength and minimize heat will be found.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #3**

External Factors Impacting the Aggregation of Proteins Associated with  
Huntington's Disease

**Michelle Wunder\*, Adam Skeens, Eiley Massinople\*, and Justin Legleiter, Ph.D.**

*C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV 26506*

**Broad category:** Sciences

**Presenter's major:** Biology

Within neurodegenerative diseases there is a large subset classified as amyloid diseases. Amyloid diseases are defined by the aggregation, or buildup, of misfolded proteins that deposit in tissues, leading to toxicity. Some diseases like this are Alzheimer's disease, Parkinson's disease, and Huntington's disease. In particular, Huntington's disease (HD) is caused by an expansion of a polyglutamine (polyQ) stretch in the Huntingtin Protein (HTT) that directly leads to aggregation. Several factors impact aggregation, thus disease progression. Several of these potential factors were investigated including lipids, divalent cations, and protein seeds. Divalent cation homeostasis is disrupted in HD, so the impact of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  on htt aggregation was also investigated in the presence and absence of lipid membranes. Based on thioflavin assays, divalent cations had no effect on htt aggregation in the absence of lipid vesicles. However, both  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  enhanced aggregation in the presence of lipids. Additionally, aggregates can template the formation of new aggregates through a process called seeding. To determine if specific domains of htt play a role in seeding, four different htt fragments were aggregated into fibrils and used as seeds. The fragments consisted of a 35-repeat polyQ sequence surrounded by different flanking sequences known to alter aggregation. To ensure seed formation, Atomic Force Microscope (AFM) was used to check for fibrils. Using thioflavin assays, each seed type showed similar seeding efficiencies, suggesting that the phenomenon is dependent on the polyQ core, not the flanking sequences.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #4**

**Modeling of West Virginia Solar and Wind Power Plants Using the System Advisor Model**

**Lillian Bischof\*, Ronald Alexander, and Fernando V. Lima, Ph.D.**

*Department of Chemical and Biomedical Engineering, West Virginia University, Morgantown, 26506*

**Broad category:** Engineering

**Presenter's major:** Chemical Engineering; Finance

West Virginia is currently highly dependent on fossil fuels for its energy production and consumption. However, the state presents a strong capability for wind and solar energy systems. To continue to expand renewable energy infrastructure in West Virginia, the feasibility of these systems must be studied. This project was conceptualized to study the System Advisor Model's (SAM's) capabilities in modeling renewable energy systems and conducting feasibility studies. In particular, the objective in this project is to model renewable energy generation for solar and wind power plants in West Virginia using SAM to provide a foundation for such feasibility studies. In this study, six wind energy plants located in West Virginia and one solar energy plant near the border of Maryland and West Virginia are modeled using SAM. Relevant weather information from the NREL Wind Toolkit or the National Solar Radiation Database and plant specifications are used to simulate plant operations in SAM. To check the accuracy of the power generation models, monthly power generations (in MWh) are compared against the Energy Information Administration's (EIA's) reported monthly power generation for each plant, and average monthly errors were calculated. After analyzing SAM models for all of the wind and solar power plants studied, the results indicate that SAM models produce consistent trends and relatively low errors (23% on average) when compared to EIA real-time monthly energy generation data for a given year. By modeling renewable energy systems with SAM, feasibility of renewable energy systems can be determined regarding performance and financial considerations.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** Honors EXCEL



**Presentation #5**

**Solar, Wind, and Thermal Storage Integration in North-Central West Virginia**

**Kevin Donnelly\*, Nagasree Garapati, Ph.D., and Fernando Lima, Ph.D.**

*Department of Chemical and Biomedical Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV 26506*

**Broad category:** Engineering

**Presenter's major:** Chemical Engineering

The north-central region of West Virginia hosts unique geographic and geological opportunities for the development of integrated renewable energy systems with thermal storage. Currently, the state does not contain large-scale electricity facilities from solar power but does host several wind farms throughout the north-central region. Additionally, this region also demonstrates higher rates of heat flux than the surrounding Mid-Atlantic region. This work features the results of simulations done for wind and solar energy generation in the state and potential storage through a subsurface geothermal reservoir. Wind and solar power within West Virginia were simulated using System Advisor Model (SAM) from the National Renewable Energy Laboratory (NREL). Wind power production is validated by comparisons to current facilities in the state, while solar production is compared to a solar facility in Garrett County, Maryland. Power production data is utilized over the course of months for easier translation to the reservoir simulation. The subsurface reservoir was modeled using TOUGH2/EOS1, a program specifically developed to simulate coupled transport of water and heat in geothermal reservoirs. Reservoir behavior (pressure, temperature) over incremental months and years of production time is analyzed. In order to achieve a more accurate pressure profile at well bores, a radial mesh is used around injection and production well bores in the simulations. The reservoir behavior is analyzed through temperature and pressure contour maps created at various time periods within the allotted timeframes. The preliminary results demonstrate the potential of such a system within the state.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #6**

**Flexible & 3-D Printable Batteries for Practical Application**

**Nathanael Wimer\*, Nicholas Winch, B.S., and Konstantinos Sierros, Ph.D.**

*Department of Mechanical and Aerospace Engineering, Benjamin M. Statler College of Engineering and Mineral Resources, West Virginia University, Morgantown, WV, 26506*

**Broad category:** Engineering

**Presenter's major:** Mechanical Engineering

Solid-state batteries (i.e., having no liquid components) are emerging as the preferred choice compared to traditional lithium-ion batteries. Solid-state batteries possess advantages such as being more compact, have higher performance potential, and are safer due to having a solid electrolyte rather than liquid, which can cause fires and is harmful to the environment. Flexible solid-state batteries have limitless application, ranging from elastic electronics to robots. This research aims to produce flexible solid-state batteries via 3D printing, which is preferable as it can be produced on the fly, and limits waste. Ink formulation of the batteries' components were investigated. Printable cathode and anode electrodes were composed of LFP (Lithium Iron Phosphate) and LTO (Lithium-Titanate-Oxide) powders chosen based on their desirable electrochemical properties. Graphite flakes were included with the active powders as an additive to improve the electrical conductivity. The electrolyte was composed of Aluminum doped LLZO (Lithium Lanthanum Zirconium Oxide) powder. The battery components were made printable by adding ethanol, allowing the substance to become viscous. Construction of the battery was formulated by having each printed component arranged in a "sandwich" manner and encapsulating it with silicone, providing flexible and elastic mechanical behavior to the unit. The battery cell was then heated to solidify the ink. The batteries' electrochemical performances were tested to measure properties such as electrical impedance, capacity, and voltage over time of operation. To illustrate scalability, many battery cells were printed in this manner and combined in a matrix, establishing a flexible, functional battery unit.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #7**

Temperature, Oxygen, and Vegetation as Drivers of Microbial Dynamics in  
Warming Boreal Peatlands

**Teagan Kuzniar\*, Chansotheary Dang, M.S., and Ember Morrissey, Ph.D.**

*Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506*

**Broad category:** Agriculture/Natural Resources

**Presenter's major:** Environmental Microbiology

Boreal peatlands, a type of wetland, have slow rates of organic matter decomposition due to the water-saturated and oxygen-limited environment. This causes the accumulation of organic carbon and sequesters atmospheric carbon dioxide. Climate warming is predicted to cause increased greenhouse gas emissions from peatlands due to increased rates of microbial metabolism and organic matter decomposition. This is expected to cause a shift in dominant vegetation with a decline in Sphagnum mosses and an increase in Polytrichum mosses. However, little is known as to how vegetation and temperature affect microbial functioning in wetland environments in the presence and absence of oxygen. To investigate these questions, we conducted a warming experiment in both the presence and the absence of oxygen using soil associated with Sphagnum and Polytrichum mosses from Cranberry Glades, West Virginia. Based on soil properties, biomass, and respiration measurements, we found that microbial responses to temperature are dependent upon oxygen availability. This indicates that precipitation changes associated with climate warming, which alters oxygen availability, may determine soil carbon responses to temperature. Additionally, the decrease in microbial biomass along with the increase in microbial respiration could lead to a loss of carbon from wetlands into the atmosphere. This reinforces the idea that carbon is being lost from these ecosystems in warming conditions. The interaction between microbial functioning, temperature, oxygen availability, and vegetation provides valuable insights as to how these ecosystems will respond to climate change on a larger scale.

**Funding:** WVU Davis College

**Program/mechanism supporting research/creative efforts:** EXCEL

**Presentation #8**

**A Comparison Between Covid-19 Case Data and Wastewater Signal in K-12 Schools**

**Logan Woodburn\*, Josh Lambert, B.S., and Timothy Driscoll, Ph.D.**

*Department of Biology, West Virginia University, Morgantown, WV 26505*

**Broad category:** Sciences

**Presenter's major:** Biology

The Covid-19 pandemic has been ongoing for nearly two years. Thought to have originated in China, the highly contagious virus made its way across the globe in a matter of months. Due to its ability to hospitalize entire populations, decisions and scientific protocols were developed in an effort to slow the spread and track the virus. One of these decisions included nationwide mask mandates. However, in recent months we have seen these mandates lifted. Accompanying these changes in safety protocol are massive spikes of Covid-19 cases, particularly with the Delta variant of the virus. Many have called into question the efficacy of masks and their ability to prevent the spread of Covid-19. My research aims to monitor the Covid-19 transmission through wastewater in elementary schools and high schools. One of these populations can receive the novel Covid-19 vaccine while the other cannot. Results should indicate that as individuals are tested and quarantined, the amount of Covid-19 in wastewater should decrease. However, preliminary results suggest that Covid-19 transmission through wastewater is persistent. My research will also analyze how Covid-19 wastewater transmission data changes as the vaccine is approved for use in children. Analysis of wastewater includes a concentration step and an RNA extraction step, both of which use the King Fisher and accompanying protocols. Finally, PCR is used to amplify the signal of Covid-19, assuming it is there.

**Funding:** COVID Epidemiology & Lab Capacity for Prevention & Control

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #9**

**Genetically Engineered Bioenergy Cane Suppresses Microbial Activity and  
Reduces Soil Carbon Losses**

**Jessica Burke\*, Edward Brzostek, Ph.D., and Zoe Pagliaro, M.A.**

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**Broad category:** Sciences

**Presenter's major:** Biology

Biofuels have the potential to provide a carbon-neutral fuel source, which would reduce carbon emissions and slow climate change. However, most current bioenergy crops are difficult to convert to fuel. To remedy this, there have been recent efforts to genetically modify crops to produce more oil to allow for easier fuel conversion. Currently, it remains an open question the extent to which the modifications to the plants will alter the activity of microbes that control soil carbon storage. As such, our objective was to determine the extent to which the decomposition and microbial respiration of genetically modified oil cane litter differ from wild-type sugar cane litter. To do this, we incubated stem and leaf litter from wild-type sugar cane and oil cane in jars. We placed the litter in forest soils that differed in their <sup>13</sup>C isotopic signatures to precisely calculate how much of the litter the soil microbes respired and how much the litter impacted soil carbon losses. After six weeks, our preliminary results show that there are no significant differences in total respiration (i.e., soil + litter) between plant types, but jars with stems had greater respiration than jars with leaves. The results also show that although the microbes are respiring the plant litter types similarly, they are respiring more of the soil carbon in the jars with wild-type litter. This result suggests that oil cane plants may suppress microbial activity, which could increase soil carbon and help mitigate climate change.

**Funding:** Center for Advanced Bioenergy and Bioproducts Innovation

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #10**

**Distribution of Tick-Borne Pathogens in Black-Legged Ticks of West Virginia**

**Jillian Goodrich\*, Kellie Daniels\*, and Timothy Driscoll, Ph.D.**

*Department of Biology, West Virginia University, Morgantown, WV 26506*

**Broad category:** Sciences

**Presenter's major:** Biology

*Ixodes scapularis*, better known as the black-legged deer tick, is a reservoir host to many pathogens, including *Rickettsia* spp. and *Borrelia burgdorferi*, the bacterium that causes Lyme Disease. *Rickettsia* species can cause a variety of illnesses, one being Rocky Mountain Spotted Fever. These pathogens can pass between a host and a tick, causing virulent diseases in humans. It is known that ticks can pass pathogens to humans and other animals through their saliva, however, the number of infected ticks relative to total ticks is lesser known. With the number of tick-borne illness cases in West Virginia growing every year, this study aims to estimate how many ticks in the state are infected with *Borrelia*, *Rickettsia*, or both. By extracting DNA from a sample of ticks and utilizing qPCR, we will estimate the number of *Ixodes scapularis* in West Virginia that are infected with *Borrelia burgdorferi* and *Rickettsia*. We also predict that with this new information, more will be understood about how many cases of tick-borne illness are unreported in West Virginia.

**Funding:** National Institutes of Allergy and Infectious Diseases

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #11**

The Function of the Sex Determination Pathway in the Development of Beetle  
Horns

**Sydney Friend\* and Teiya Kijimoto, Ph.D.**

*Davis College of Agriculture, Natural Resources and Design, West Virginia University, Morgantown, WV  
26505*

**Broad category:** Sciences

**Presenter's major:** Animal and Nutritional Sciences

The mechanism by which sexually dimorphic traits develop is diverse across the animal kingdom, however; it is still not fully understood. This study utilized the development of sexually dimorphic horns in the dung beetle species *Onthophagus taurus*. In the past, we have shown that the sex determination gene *doublesex (dsx)* regulates horn sexual dimorphism by promoting its development in males and inhibiting it in females. Here we focus on the potential significance of genes *intersex (ix)*, *transformer (tra)*, and *transformer-2 (tra2)* in the development of *O. taurus* horns in relation to *dsx*. *Tra* and *tra-2* are assumed to be regulators of the sex-specific splicing of *dsx* pre-mRNA in female *Drosophila* (fruit flies) while remaining inactive in males. *Ix* in *Drosophila* is proposed to be a transcriptional cofactor of *dsx* but like *tra/tra-2* it is inactive in males. The interactions of *ix, tra*, and *tra-2* regarding the developmental pathway of beetles and their horns are not presently known. To address this question, systematic functional suppression of genes *ix, tra*, and *tra-2* will be implemented to observe developmental changes in male and female beetles. Due to their conserved function in other insects, we expect that by repressing *ix, tra*, and *tra-2* female beetles will express male traits such as horns. In this event, we will discuss the latest results of the functional study.

**Funding:** USDA NIFA AFRI

**Program/mechanism supporting research/creative efforts:**

**Presentation #12**

**Tokata Iron Eyes, Her Heritage, and How that Informed Her Actions at Standing  
Rock**

**Sarah Potter\***

*WVU Native American Studies Program, Morgantown WV, 26506*

**Broad category:** Agriculture/Natural Resources

**Presenter's major:** English

Tokata Iron Eyes is the daughter of activists, and has been an activist herself since the tender age of 9. I suggest that her alignment to her Lakota heritage and involvement in her community, the Standing Rock Sioux Tribe, influenced her decisions and actions during the #NoDAPL Resistance. I review her personal history, her first activist appearance, her co-involvement in the creation of the #RespectOurWater social media movement which lead to the creation of the #NoDAPL hashtag and the popularization of water protectors, natural rights, and her efforts to educate the world on Indigenous ways of being. I discuss different sources in conjunction of not just with Tokata Iron Eyes, but also LaDonna Brave Bull Allard, who's land hosted one of the camps at Standing Rock during the 2016-2017 protest. Here, I have images from the protest and Tokata's life after the #NoDAPL protest, combined with direct quotes from her and people discussing her, as well as examples of her work, post-graduate, campaigning for natural rights and protection for water everywhere. I found that Tokata Iron Eyes' upbringing and life experiences have decidedly influenced her choices in her activism. The actions she takes in conjunction with other Indigenous youth will be some of the the foundations of this generations environmental activism.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:**



**Presentation #13**

Examining the Link Between Gsx1 and Efnb2a Expression in the Zebrafish Visual System

**Shelby May\*, Haiden Placer\*, Alexandra R Schmidt, and Sadie A. Bergeron, Ph.D.**

*Departments of Biology and Neuroscience, West Virginia University, Morgantown, WV 26505*

**Broad category:** Sciences

**Presenter's major:** Neuroscience

Genomic screen homeobox 1 (*gsx1*) is a gene that encodes a transcription factor that regulates networks of genes involved in central nervous system development. *gsx1* is prominently expressed in the developing visual system in zebrafish. A functional visual system is vital for zebrafish behaviors such as escape response and prey capture. Previous research shows that *gsx1* mutant zebrafish have disrupted retinal ganglion cell axon termination in the pretectum that results in reduced visual abilities. Ephrins are well-known chemical cues that are essential for axon guidance and termination in the visual system. Ephrin-B2a (*efnb2a*) is a gene that encodes a specific ephrin ligand that is involved in repulsion and adhesion of neurons in zebrafish. In this experiment, we aimed to observe if *efnb2a* expression is regulated by *Gsx1* by examining its expression using whole mount in situ hybridization (WISH) in *gsx1* mutant zebrafish. Preliminary data shows that we were successful in synthesizing a WISH probe for *efnb2a* and imaging *efnb2a* expression in the pretectum at 72 hours post fertilization. Further analysis aims to determine if *efnb2a* expression is reduced in the pretectum of *gsx1* mutants to cause the axon defects previously reported.

**Funding:** NICHD, NIH

**Program/mechanism supporting research/creative efforts:**

**Presentation #14**

**Genetic Analysis of the Final Steps in Lysergic Acid Amide Synthesis**

**Lauren M. Bish\* and Daniel G. Panaccione, Ph.D.**

*Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26505*

**Broad category:** Sciences

**Presenter's major:** Biochemistry

Ergot alkaloids derived from lysergic acid are important in agriculture, as food and feed contaminants, and in medicine, where they serve as the bases of several pharmaceuticals. The fungus *Metarhizium brunneum* makes lysergic acid amides, with lysergic acid  $\alpha$ -hydroxyethylamide (LAH) being produced in the highest concentration. The multifunctional enzyme lysergyl peptide synthetase C (LpsC) has domains that play important roles in LAH synthesis. We propose a new role for the reductase domain (found on the carboxy terminus of LpsC) in the final step of LAH synthesis. We designed a CRISPR/Cas9-based experiment to edit the reductase domain of LpsC, while leaving the earlier domains intact. We made a guide RNA to target Cas9 to the active site of the reductase domain and a donor DNA that will replace amino acids at the active site of the reductase domain with non-functional amino acids. We transformed *M. brunneum* with these genetic components and a fragment conferring bialophos resistance to serve as a selectable marker. We obtained at least 30 bialophos-resistant colonies from the first transformation and are in the process of screening them for mutations at LpsC. We developed a PCR-RFLP assay that will allow us to discriminate between wild type and edited alleles. If we are successful in editing the reductase domain, the chemical profile of the mutant, as determined by high-performance liquid chromatography (HPLC) and mass spectrometry, will tell us if the reductase domain has a role in producing LAH.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:**

**Presentation #15**

**A Novel Gene Associated with the Ergot Alkaloid Pathway**

**Abigail Jones\* and Daniel G. Panaccione, Ph.D.**

*Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506*

**Broad category:** Sciences

**Presenter's major:** Biochemistry

Lysergic acid-derived ergot alkaloids are important scaffolds in the production of pharmaceuticals prescribed to treat dementia, migraines, and hyperprolactinemia. Fungi in the family Clavicipitaceae are used in the current production of these chemicals, but they are slow growing and difficult to modify genetically. We hypothesized that if *Aspergillus* species, some of which contain early steps in the lysergic acid pathway, could produce lysergic acid-derived ergot alkaloids they would be better producers since they are fast growing and easily manipulated genetically. Through genome mining, we identified three species of *Aspergillus* that contained the necessary genes to produce lysergic acid derivatives. One species, *Aspergillus leporis*, had a previously unidentified gene, *easT*, located among the other genes associated with lysergic acid production. The gene had similarities to a major facilitator transporter, so we hypothesized it had a role in the transport or secretion of ergot alkaloids. We expressed the gene in a strain of the fungus *Neosartorya fumigata*, which had been previously engineered to produce lysergic acid but which accumulated only small quantities and retained the lysergic acid in its cells as opposed to secreting it. Expression of *easT* caused a large increase in accumulation of the precursor to lysergic acid but production and secretion of lysergic acid was not improved. These data indicate that *easT* is important in trafficking intermediates in the lysergic acid pathway within the cell but not for secretion. We are using a CRISPR-based approach to study the role of *easT* in its native fungus, *A. leporis*.

**Funding:** Arnold and Mabel Beckman Foundation, NIH

**Program/mechanism supporting research/creative efforts:**

**Presentation #16**

**Examining Polymerase Chain Reaction Fundamentals Through Genotyping Mutant Zebrafish Lines**

**Emery A. Kronemeyer, Rebecca A. Coltogirone, Heather E. Price, and Sadie A. Bergeron, Ph.D.**

*Department of Biology, Department of Neuroscience, West Virginia University, Morgantown, WV 26506*

**Broad category:** Sciences

**Presenter's major:** Biology

Genomic screen homeobox genes 1 and 2 (*gsx1* and *gsx2*) encode transcription factors, which are regulatory proteins that control the expression of genes. The expression of these genes is specific to the nervous system. When mutated, they affect vital processes in the developing brain. 84% of genes related to human diseases have orthologs in the zebrafish genome. Zebrafish develop externally and reproduce quickly, making them good vertebrate model organisms for diverse observations. We want to know the relationship between *gsx1* and *gsx2* in zebrafish because very specific relationships between these genes are known in mice, but only in the forebrain. *gsx1* and *gsx2* are expressed in other brain regions including optic tectum, pretectum, and cerebellar plate, where much less about their function is known. When *gsx2* is mutated in mice, the expression of *gsx1* expands in the forebrain, and we hypothesize that it is similar in zebrafish. Previous work in the lab documented developmental expression of *gsx1* and *gsx2* in wildtype zebrafish and assessed mutants made with TALENs. We want to investigate if the loss of *gsx1* affects the expression of *gsx2*, and if the loss of *gsx2* affects the expression of *gsx1*. This was to be performed by extracting RNA from PCR genotyped samples to run RT-qPCR. This poster shows the troubleshooting that can come with a project like this. Understanding the relationship between these two genes and the roles they play in neurodevelopment is vastly aided by the zebrafish model system.

**Funding:** NICHD

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #17**

**Outcomes of Newly Trained Robotic Surgeons Suggest Safe Implementation at an Academic Institution**

**Christopher Kenney\*, Britney Niemann, Amanda Puleo, Carl R. Schmidt, M.D., J. Wallis Marsh, M.D., and Brian A. Boone, M.D.**

*Department of Surgery, West Virginia University School of Medicine, Morgantown, WV, 26506*

**Broad category:** Health Sciences

**Presenter's major:** Biology

**Objectives:** This study seeks to provide data on the experience of a new surgeon establishing a robotic hepato-pancreatic-biliary (HPB) practice. **Background:** Although robotic HPB surgery has expanded dramatically in recent years, there is a lack of data with regards to the results of newly trained surgeons and outcomes of robotic HPB surgeries in their early practice. This data is important for establishing a benchmark for surgeons/institutions seeking to initiate a robotic HPB surgery program. **Methods:** The results of open and robot-assisted HPB procedures of a new faculty surgeon at a tertiary referral academic medical center were investigated and compared to historical data. This was done through a retrospective analysis of a prospectively maintained surgical database. **Results:** Operative time, blood loss, median length of stay, conversions to open surgery, 90-day mortality rate, and major complications were all at or improved compared to historical benchmarks of established surgeons. The overall experience establishing a robust HPB practice provided several important lessons that are noteworthy for new surgeons, including importance of a robotically skilled surgical team, and frequent involvement of senior faculty as bedside assistants. **Conclusions:** With proper training and attention to several principles outlined in the current manuscript, junior faculty surgeons can safely implement a robust robotic HPB practice at a new institution.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #18**

**Examining the Trends in Intra-Session Heart Rate Variability During Float-REST and Dry Float Modalities**

**Hana Ulman, B.S., Lauren Rentz, B.S., Andrew Thompson, Ph.D., Abigail Baker\*, Jad Ramadan, M.S., Josh Hagen, Ph.D., Jason Stone, M.S., and Scott Galster, Ph.D.**

*Rockefeller Neuroscience Institute, West Virginia University, Morgantown, West Virginia, 26505*

**Broad category:** Health Sciences

**Presenter's major:** Industrial Engineering

Float Reduced Environmental Stimulation Therapy (Float-REST) has many known physiological and psychological benefits, including, but not limited to, enhanced relaxation and stress mitigation by creating an environment deprived of sensory stimulation. Recently, dry-float therapies have gained traction by offering an alternative, but similar, reduced-sensory environment to that of Float-REST. To our knowledge, there have been no studies presently that have examined the changes in intra-session heart-rate variability metrics during the floatation session and between the two types of floatation modalities. Nine participants completed a one-week baseline followed by three weeks in the first randomly assigned modality where a minimum of five sessions were completed. After a one-week break, the second three weeks with at least five sessions in the remaining environment were completed. During each session, participants donned a Polar H10 chest strap which collected their heart rate variability data. These data were analyzed using Kubios HRV 3.4.3 Analysis Software. Results are indicative of an increase in parasympathetic tone as session time progressed, as denoted by the significant main effect in time SDNN ( $p = 0.0026$ ). Furthermore, the dry float modality had a significantly lower LF/HF ratio ( $p = 0.0079$ ) than Float-REST and higher RMSSD ( $p = 0.0005$ ) and HF log ( $p = 0.0266$ ), jointly pointing towards a heightened parasympathetic tone, indicative of increased relaxation. Understanding the autonomic profile of individuals throughout the float session provides insight into the physiological response that such recovery modalities elicit in healthy populations.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #19**

**Lower Body Joint Mechanics Following Anterior Cruciate Ligament Injury in Elite  
Female Soccer Players**

**Axel Schon\*, Lauren Rentz, B.S., and Scott Galster, Ph.D.**

*Rockefeller Neuroscience Institute, West Virginia University, Morgantown, WV 26506*

**Broad category:** Health Sciences

**Presenter's major:** Biomedical Engineering

Background: Anterior Cruciate Ligament (ACL) tears remain the most common chronic injury among soccer players, especially among females.<sup>1</sup> These injuries not only limit the return to an athlete's previous ability, but also increase the probability of future injury. The aim of the present study was to identify whether prior ACL injury influences the lower body joint mechanics of female soccer players. Methods: Twenty-five Division I women's soccer athletes performed the stork stance (SS), vertical jump (VJ), and drop jump (DJ). These activities biomechanics were quantified using the Dynamic Athletic Research Institute (DARI) motion analysis system. Using JMP software, two-way ANOVAs were utilized to compare biomechanics across sides and ACL injury history. Results: A main effect of side was found for knee dynamic valgus in the VJ, DJ, and SS, with degree of valgus trending higher in the right leg, independent of injury history. During SS, hip adduction was found to have a main effect of side, as well as an interaction between side\*injury history; a pairwise comparison demonstrated greater degrees in the right leg of individuals with no previous knee injury, but no bilateral difference in those with a previous injury. VJ knee torque demonstrated an interaction between side\*injury history, whereas this interaction neared significance for knee flexion. Conclusions: These results suggest that lasting impairments in knee and hip stability may exist following a history of ACL injury. These trends are mostly supported by prior research, suggesting the presence of modified mechanics following knee injury among female soccer athletes.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #20**

Reducing Blue Wavelength Lighting Ameliorates Infarct Deficits Caused by Dim  
White Light at Night

**Max Bingman\***, Jennifer A. Liu, Jacob R. Bumgarner, William H. Walker II, O. Hecmarie Melendez-Fernandez, Ning Zhang, James C. Walton, A. Courtney DeVries, and Randy J. Nelson, Ph.D.

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**Broad category:** Health Sciences

**Presenter's major:** Neuroscience

Internal circadian rhythms drive physiology and behavior, and are synchronized to natural light-dark cycles to optimize function and survival. Previous research in our lab has reported that exposure to dim light at night (dLAN) can induce neuroinflammation and increase infarct volume post-stroke. Thus, we investigated whether melanopsin-expressing intrinsically photosensitive retinal ganglion cells (ipRGCs) play a role in this phenomenon. Because melanopsin is maximally sensitive to short-wavelength (blue) light, we hypothesized that blue light at night evoked these negative effects. To test this hypothesis, five-month-old (+/- 1 month) male CFW mice maintained on 12h light (150 lux) 12h dark (0 lux) (LD) conditions received a right middle cerebral artery occlusion (MCAO), then were returned to normal LD conditions or were placed into dim white light at night (dLAN; 5 lux), dim red light (5 lux), or into blue-filtered dim white light (5 lux) equated to equal intensities to the dLAN treatment group. 24 hours post stroke, mice were tested and collected for analysis. Mice housed in dLAN displayed increased neurological deficit scores and increased infarct size compared to LD, dim red light, and blue-filtered treatment groups, suggesting that filtering blue wavelength can ameliorate this increased infarct deficit observed with dLAN. Preliminary results indicate amplified pro-inflammatory TNF $\alpha$  expression in the cortex and caudate nucleus, suggesting that TNF $\alpha$  may be responsible for mediating infarct deficits. This study highlights the importance of reducing disrupted circadian rhythms during acute cerebrovascular dysfunction by limiting nighttime lighting in the clinical setting to limit penumbral progression.

**Funding:** NIGMS

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #21**

**Traumatic Brain Injury Exacerbates Ischemic Stroke Outcomes**

**Ali Albowaidey\*, Bailey Whitehead, Ruth Velazquez Cruz, Zachary Weil, Ph.D., and Kate Weil, Ph.D.**

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WV 26506*

**Broad category:** Health Sciences

**Presenter's major:** Immunology and Medical Microbiology

Traumatic brain injuries (TBI) are a major cause of death and disability in the United States. Prior research shows that trauma disrupts the integrity of cerebral blood vessels. Moreover, TBI is associated with greater severity of stroke in clinical populations, a phenomenon we have modeled in mice. The goal of this study is to explore the mechanisms mediating this phenomenon, with the hypothesis that TBI-induced vascular dysfunction worsens stroke outcomes. To assess vascular function, mice underwent mild TBI, or a control injury (sham) followed by middle cerebral artery occlusion (MCAO) seven days later. After five days of recovery, motor impairments were assessed with behavioral tasks. Mice brains were then extracted and stained with 2,3,5-Triphenyltetrazolium chloride (TTC) to measure infarct size. Motor impairments were observed in TBI mice compared to shams, with TTC staining revealing larger infarcts in TBI mice. Furthermore, we assessed blood-brain barrier (BBB) permeability by injecting fluorescent tracers into TBI or sham mice before blood collection and brain extraction to measure fluorescence of serum and brains. Mice that underwent TBI expressed increased BBB breakdown in comparison to sham. Finally, we assessed astrocyte integrity on mice with either TBI or sham injury. Mice recovered for 7, 14, or 28 days before undergoing an MCAO and collecting tissue. We then performed immunohistochemistry, labeling aquaporin-4 (AQP4) and glial fibrillary acidic protein (GFAP). TBI mice expressed higher AQP4 levels compared to shams. Collectively, these findings suggest that TBI-induced vascular dysfunction is associated with increased infarct size, BBB breakdown, and increased astrocyte activation.

**Funding:** American Heart Association, NIH P20GM109098, and West Virginia University Clinical and Translational Science Institute.

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #22**

**Big 5 Personality Type Correlation to Nicotine Addiction**

**Abigail Rider\* and Kevin Larkin, PH.D.**

*Department of Psychology, West Virginia University, Morgantown, WV, 26505*

**Broad category:** Sport Science/Psychology

**Presenter's major:** Biochemistry

The big 5 personality traits are described as extraversion, agreeableness, openness, conscientiousness, and neuroticism. The big five theory is used to describe the essential traits that can serve as the basis of personality. Previously a study done showed that personalities with high neuroticism, low agreeableness and low conscientiousness are more prone to having substance-addictive personality traits than others in the big five. This study investigated the association of the big five, comorbidity between disorders, extent to explain comorbidity, men vs. women results and the magnitude of personality differences. To show the association of the big five and men vs. women results, students will be asked to complete a survey with a range of questions. This includes demographic questions with personal background and smoking questions, personality, health behaviors, extroverted or introverted and delayed discounting questions. The data collected will then be compared with other studies to show the correlation between personality types and nicotine addiction. The predicted outcome is that students who answer questions closely relating to the big five personality types of high neuroticism, low agreeableness and low conscientiousness are more likely to use nicotine more often than those who don't relate to those big five personality types.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #23**

**Safety and Efficacy of Buprenorphine Plus Naloxone for Pregnant Women and Newborns**

**Hannah Smart\* and Wanhong Zheng, MD**

*Department of Behavioral Medicine and Psychiatry, West Virginia University, Morgantown, WV 26506*

**Broad category:** Health Sciences

**Presenter's major:** Neuroscience

During pregnancy, opioid use disorder (OUD) is correlated with an increase in preterm labor, fetal mortality, and fetal abnormalities. Research has indicated that buprenorphine plus naloxone is highly effective and safe when compared to monotherapy methadone and monotherapy buprenorphine. It may provide better outcomes when compared to methadone and monotherapy buprenorphine. Buprenorphine plus naloxone is found to be safe maternally by reducing Cesareans, preterm deliveries, and overall hospitalization admissions and durations. In newborns, buprenorphine plus naloxone has shown a reduction in neonatal abstinence syndrome (NAS) and concerning birth weights. Through assessment of gestational age, birth weight, prematurity, admission to neonatal care units, and duration of time spent in neonatal care units it was found that NAS was less prevalent and occurred more infrequently amongst newborns whose mothers were treated with buprenorphine plus naloxone rather than methadone alone. When buprenorphine alone was compared to buprenorphine plus naloxone for treating newborns of OUD mothers, the rate of NAS was significantly higher in newborns exposed to buprenorphine alone. Overall, buprenorphine plus naloxone has shown to have a significantly higher rate of safety and efficacy compared to methadone and buprenorphine monotherapy. This review article will supply information and data for women and healthcare providers who are questioning or wanting to learn more about the combination of buprenorphine plus naloxone to treat OUD in pregnancy and its safety in the newborn.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #24**

**Incidence, Prevalence, and Outcomes of Pediatric Trauma in Rural Appalachia  
From 2017 to 2019**

**Isabella Balko\* and Pavithra Ellison, MD, FASA**

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**Broad category:** Health Sciences

**Presenter's major:** Biology

Rural pediatric trauma has its unique incidence, presentation, and distribution due to mechanisms of injury, geographic location, access to care, and social issues. We reviewed pediatric trauma in West Virginia from 2017-2019. Trauma database was analyzed, ages 0-18 from 2017-2019 in the Appalachian regions in West Virginia. Gender, injury mechanism, Glasgow Coma Scale Score (GCS) at admission, injury severity score (ISS), toxicology screen results, hospital length of stay, duration of ventilatory support, number of procedures performed during admission, presence of non-accidental trauma, cardiac arrest, patient discharge disposition, and mortality were analyzed. 1182 patients were admitted to the trauma center. 37% female and 63% male. 11-18 age group, 24% female and 76% male. Injuries were: blunt force (89%), penetrating injuries (7.2%) and burns (1.4%). Majority had minor or moderate injuries with 95% receiving a Glasgow Coma Scale (GCS) >13 and 72% listed as minor on the injury severity score (ISS). 0-2 years had the highest proportion of poor (0-8) GCS scores, high ISS (>14) scores, most hospital admission days, days on a ventilator, mortality, most pre-hospital cardiac arrests, child abuse, burns, and placement with child protective services. 31% of children tested, and 17% in ages 0-2 had a positive toxicology screen. There were 3670 procedures done. Under 2 are most vulnerable to poor outcomes and need preventative interventions. Toxicology screens need to be implemented in pediatric trauma. Rural trauma has endemic issues related to substance abuse, poverty, and lower degree of social support as compared to urban areas.

**Funding:** N/A

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #25**

**Determining the Effects of a Weighted Blanket in the MRI Environment**

**Alexandra Benyola\*, Scott Galster, Ph.D., Tyler McGaughey, and Victor S. Finomore Jr. Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Neuroscience and Psychology

A large number of individuals end a Magnetic Resonance Imaging (MRI) scan prematurely, interrupting research studies and the collection of medical information due to their anxiety. Previous studies have found that weighted blankets decreased anxiety for most participants. We propose that the use of weighted blankets will decrease patient anxiety, resulting in longer and more comfortable MRI sessions. This study's goal is to have 30 participants. The participants in this study will be separated into two groups, a control group without the use of a weighted blanket and an experimental group that will use a weighted blanket during an MRI scan. During the scan, heart rate variability, Galvanic Skin Response (GSR), and time spent in the MRI will all be measured to make an accurate model of the level of anxiety experienced by the participants. We expect that heart rate variability will increase, GSR will decrease, and time spent in the MRI will increase compared to the control group. After the scan, participants will be asked to complete a survey to record their comfort level, in which we expect to see an increase in comfort levels with the use of the weighted blanket. This ultimately means more research can be conducted to its fullest potential with the use of a weighted blanket during MRI scans, which will increase knowledge in many aspects of the scientific field.

**Funding:** Rockefeller Neuroscience Institute, WVU, Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #26**

**Single Vape Exposure on Middle Cerebral Artery Function Over a 72-hour period**

**Madison R. Robinson\*, Amber Mills, B.S., Ally Kirk\*, James Frazier, B.S., Paul Chantler, Ph.D., and I. Mark Olfert Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology

Vaping is known to cause impairments in blood vessel function, but little is known about how long vessel dysfunction remains after vaping. We hypothesized that dysfunction would be evident in the middle cerebral artery (MCA) of the brain within 24 hours of vape exposure and recover by 48 hours. We measured MCA vessel reactivity in air-exposed (control) rats and in rats assigned to 2-, 24-, 48- or 72-hour groups following a single 1-hour vape exposure. E-liquid consisted of 50:50 propylene glycol: vegetable glycerin mix with no nicotine or flavoring. Compared to control, the greatest decline in MCA dilation (to either acetylcholine or sodium nitroprusside) was at 24-hours (-51%,  $p < 0.05$ ) and was restored by 72-hours post vaping (-5%,  $p = ns$ ). Impaired MCA constriction to phenylephrine was greatest at 2-hours (-41% compared to control,  $p < 0.05$ ) and was restored at 72-hours (+2.6%,  $p = ns$ ). Our data is important because it shows that a single vape exposure causes significant MCA dysfunction that peaks within 24-hours, but takes 72-hours for normal function to be fully restored.

**Funding:** NIH Grant R21 ES033026-01, U54-GM104942-05S1, P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence, WVU SURE, HRD Louis Stokes STEM Pathways and Research Alliance: KY-WV LSAMP, 1826763

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #27**

Preventing Iatrogenic Injury to the Dorsomedial Cutaneous Nerve of the Hallux

Emily R. Dumford\*, Allison J. Hess\*, Zachary Gumble, Alexander J. Pocwierz, Makaela Quinn, Marianna E. Jones, Matthew J. Zdilla, and H. Wayne Lambert, Ph.D.

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**Broad category:** Health Sciences

**Presenter's major:** Forensic Examiner

The dorsomedial cutaneous nerve of the hallux (DMCN) is a sensory nerve that crosses the extensor hallucis longus (EHL) tendon to innervate the great toe and the first metatarsophalangeal joint. The DMCN is vulnerable to injury during operative procedures including hallux valgus and hallux rigidus correction, bunionectomy, and cheilectomy, as well as EHL tendon transfer surgeries. Intraoperative injury to the DMCN may cause pain that is intractable without subsequent surgical intervention. Accordingly, understanding anatomical variation of the DMCN is of the utmost importance. Therefore, this study assessed twenty-three cadaveric legs and feet to identify morphological variations of the DMCN. Observed variations included supernumerary branches crossing the EHL tendon and atypical superficial fibular nerve branching that affected the anatomical relationship between the DMCN and the EHL tendon. This study provides details of atypical variations of the DMCN and the resulting data; when used in conjunction with current imaging techniques like ultrasonography, it may help to prevent any unwarranted iatrogenic nerve injury.

**Funding:** LSAMP

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #28**

**Bilateral Discovery of the Fibulocalcaneus Externum Invertus: A novel Fibularis Quartus Variant.**

**Allison J. Hess\*, Reagan E. Martignetti\*, B. Diane Gillis, Matthew J. Zdilla, Jillian S. Davis, and H. Wayne Lambert, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Biology

The fibularis (peroneus) quartus is a variant muscle found within the lateral leg compartment in ~11.5% of cadaveric specimens, though recent studies show a higher prevalence of ~20.9 – 21.9%. The proximal muscular attachments can originate from the fibula, fibularis brevis, fibularis longus, and/or the intermuscular septi, which forms the boundaries of the lateral leg compartment. The distal attachment of the fibularis quartus varies greatly, but often inserts into the lateral surface of the calcaneus into the fibular trochlea or the retrotrochlear eminence. During the routine dissection of a 79-year-old Caucasian male, a rare and previously unidentified variation of the fibularis quartus muscle was discovered. Although this variant is seen arising from the fibularis longus and attaching distally onto the lateral surface of the calcaneus, it is unique in that the muscle is inverted, with the tendinous part being more proximal and the muscular portion arising distally. Given its unique anatomy, we have named this variant the fibulocalcaneus externum invertus muscle. This variant was found unilaterally initially, but ultrasonographic imaging verified its bilateral presence. The dissection of the right lower leg revealed a similar inverted muscle, but this variation split into two distal muscle bellies inserting into the retrotrochlear eminence posteriorly and the fibular trochlear anteriorly. Clinically, this novel muscle variant has implications for chronic lateral ankle pain as well as ankle instability, making its presence important for clinicians, surgeons, and radiologists when assessing radiological imaging or preparing for ankle surgeries within or around the lateral leg compartment.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #29**

Visualizing Photoreceptor Cilia in the Retinas of Scorpion-GFP Transgenic Zebrafish

**Kendra Wolford\*, Kristen Haggerty, Sadie Bergeron, Ph.D., and Michael Robichaux, Ph.D**

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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology

Zebrafish, *Danio rerio*, is a model organism that exemplifies the cell biology of photoreceptor neurons, which are the light-detecting neurons in the retina. Like other vertebrate photoreceptors, zebrafish rods and cone photoreceptors feature a modified sensory cilium, known as the outer segment, that supports the membrane discs where phototransduction occurs. The connecting cilium (CC) is narrow, 300 nm in diameter, portion of the photoreceptor cilium that links the outer segment to the biosynthetic inner segment of the cell. The CC is a constriction of the entire photoreceptor, through which an enormous load of protein and lipid trafficking must occur. Yet, the dynamics of the protein movement through the CC have not been examined with the live cell microscopy due to the technical challenges of the small size of rods and cones and the difficulty of isolating them for this type of imaging. Our goal is to develop a transgenic zebrafish line with fluorescent markers for the CC that is compatible with future live cell imaging. In this study, we generate transgenic zebrafish expressing a global GFP-fusion of scorpion/arl13b, which is a protein localized to the CC. We used immunofluorescence staining of photoreceptor markers and SIM super-resolution microscopy to determine if scorpion-GFP is an efficient marker of the CC in transgenic and control zebrafish retinas at 5 days postfertilization. We found a variable pattern of scorpion-GFP expression in the outer segment of rod and cone photoreceptors, demonstrating that new transgenic lines must be developed.

**Funding:** Knights Templar Eye Foundation Early Career Starter Grant (MAR)-Institutional and Private funding, Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #30**

**3D Bioprinting a Model Artery with FRESH Bioprinting**

**Duncan McGee\*, Vignesh Sivashankar\*, Ryan O'Connell, Oxana Tseytlin, Andrey Bobko, Ph.D., Sajad Sarvari, and Mark Tseytlin, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Biomedical Engineering

Bioprinting can be used in tissue engineering to replicate human body parts like blood vessels, bones, and other natural tissues. This emerging bioengineering method provides an alternative to the animal-based drug testing approach. Bioprinted human cells, tissues, and organs are becoming valuable models during the research and development of new types of treatments. We adapted a 3D plastic printer to print with bioinks, like alginate, using freeform reversible embedding of suspended hydrogels (FRESH) bioprinting method. The main goal is to optimize the printer settings, such as the print speed and extrusion rate, using the Ultimaker Cura 3D printing software to increase the bioprint's resolution. FRESH utilizes a gelatin support bath to hold the alginate during the printing process. The gelatin beads are in a calcium chloride solution that facilitates the polymerization of the alginate after printing. The sodium alginate forms a hydrogel through ionic cross-linking in the presence of the divalent cation calcium. After the print finishes, the gelatin support bath is heated up to body temperature to melt the gelatin leaving the finished alginate print. Using FRESH 3D-bioprinting, we successfully printed an alginate tube to model an artery. We then imaged the alginate tube using the locally built electron paramagnetic resonance (EPR) imaging system. EPR permits 3D mapping of oxygen and other essential for life molecules. Changes in oxygen distribution across the tube will be imaged. As a result, we will determine the oxygen diffusion rate from inside of the tube to outside in this proof-of-concept experiment.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #31**

**Short-term Behavioral, Physiological, and Brain Differences in Real Life and Virtual Reality Social Interactions**

**Helen Melnick, Nanda Siva, Noor O. Qazi, Karianne K. Sretavan Wong, Julie Brefczynski-Lewis, Ph.D.,  
and Alexandra Dickey\***

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**Broad category:** Health Sciences

**Presenter's major:** Biology

Virtual reality (VR) is a relatively new tool. Because of its ability to immerse in inaccessible lab environments and control variables, it may become an important tool in medicine and research, especially for our lab's patented VR brain imaging system. Our goal was to compare VR delivered social stressors with a live study, where participants interacted with an actor/avatar trained to give a set of negative responses in three-minute interactions, with a hypothesis of no significant difference in VR vs. Live. We chose two different simulations – confronting a messy roommate and confronting a lazy group project member – with randomized order of VR vs. Live simulations (n=52). Systolic (SBP) and diastolic blood pressures (DBP) were measured after four points – an initial 10 minute rest (R1), the first event (E1), a second rest (R2), and the second event (E2) – with heart rate (HR) continuously monitored. We then compared the measurements between E1-R1, R2-R1, E2-R1, and E2-R2 for both SBP and DBP for each scenario of VR vs. Live conditions. Our main results with both scenarios combined tell us that using VR did not significantly differ from Live in evoking BP increases, with HR also increasing for the scenarios, confirming our hypothesis. However, caution may be needed in interpretation, as when each simulation was processed separately, the Group Project yielded a significant increase in SBP for the Live vs. VR interaction. In the future, we plan to use VR in combination with PET scanning to monitor brain functionality.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #32**

**Synaptic Zinc's Effect on how the Neurons in the Auditory Cortex Respond to Sound**

**Ava Koontz\*, Charles Anderson, Ph.D., Abbey Manning, Mason McCollum, and Philip Bender**

**Broad category:** Health Sciences

**Presenter's major:** Immunology and Medical Microbiology

Schizophrenia affects approximately 2.6 million adults in the United States; it is complex and can lead to psychosocial disabilities. Schizophrenia is a disorder of cortical function, including changes in the function of the auditory cortex. Mutations in proteins important for controlling the neuromodulatory system's synaptic zinc are associated with schizophrenia. This study works to address how synaptic zinc supports the function of the auditory cortex. While animal models do not have human neuropsychiatric disorders, their brains are useful model systems to understand human brain function. Using brain slicing, data analysis of microscope images, and behavioral analysis, it has been identified that mice lacking high levels of cortical synaptic zinc are less able to detect changes in the auditory environment. This project is focused on the effects of zinc signaling at specific cortical synapses with a focus on proteins that alter synaptic structure and neuronal axon targeting. This suggests that these proteins play a fundamental role in supporting cortical computation and brain function.

**Funding:** National Institute of General Medical Sciences

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #33**

Quantifying the skill of Robotic Surgeons Using a Biomechanical Method of  
Assessment

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**Broad category:** Health Sciences

**Presenter's major:** Biomedical Engineer

A study done by The American College of Surgeons in 2002 the average person will receive 9.2 surgeries in their lifetime 5.97 of these will be Operating Room procedures (ACS). As we go through the years most of the procedures done will be Robotic Surgeries, a relatively new type of Surgery in which a Surgeon controls a robot "...to perform many types of complex procedures with more precision, flexibility and control than is possible with conventional techniques" (Mayo Clinic). However, there is no standardized curriculum or unified certification program in the United States (BJUI). At the lab that I work at we have developed a way to quantify the skill of robotic surgeons by measuring the movements in the forearm by using wavelet decomposition while they completed a simulation on the Da Vinci robot. The data was then imported to MATLAB coding software and was processed to create a Diagnostic scale in which their skill could be ranked and the individual could see in what areas they could improve.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #34**

Hepatic Xanthine Oxidoreductase Upregulated by Nano-Titanium Dioxide  
Exposure

**Madison Seman\***, Krista Garner, Juile Griffith MSc, Kallie Schafner\*, Alexandria Lusk\*, Eric Kelley  
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**Broad category:** Health Sciences

**Presenter's major:** exercise physiology

Nano-titanium dioxide (nTiO<sub>2</sub>) is used extensively in industrial and consumer products. Risk of exposure continues to grow and understanding maternal-fetal outcomes to exposure is a continuing focus of Environmental Health and Safety. Previous reports show inhalation of nTiO<sub>2</sub> impairs vascular function during gestation. Our lab's observations suggest oxidant production is involved in this process, but the source remains unknown. Elevated levels of xanthine oxidoreductase (XOR), has been observed in inflammatory and oxidative disease conditions. In disease, XOR is converted to the oxidized form (XO) resulting in oxidant production and when released into the circulation where it can bind the endothelium and disrupt function. Therefore, we hypothesized XOR, is upregulated by nTiO<sub>2</sub> exposure. Pregnant Sprague-Dawley rats were exposed to air or nTiO<sub>2</sub> (concentration 12±0.5mg/m<sup>3</sup>, cumulative lung burden 525±16µg) for 6 nonconsecutive days, with assessments on gestational day 20 (day before birth) and AML12 hepatocytes were exposed to 5µg/ml of nTiO<sub>2</sub> in culture to test the impact of nTiO<sub>2</sub> on hepatic XOR. Relative liver mass increased in nTiO<sub>2</sub> dams (0.038±0.0001 vs 0.04±0.0001). Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>, measure by coumarin boronate) production was elevated in liver (5-fold) and nTiO<sub>2</sub>-treated hepatocytes (2-fold). XOR expression was increased 2-fold in both nTiO<sub>2</sub> livers and cultured-hepatocytes. Liver XO activity measured by liquid chromatography (HPLC) was significantly elevated in nTiO<sub>2</sub> compared to air livers (215±75 v. 18±8mU/mg). In culture nTiO<sub>2</sub> induced XO release from hepatocytes (~3-fold). In conclusion nTiO<sub>2</sub> exposure stimulates the upregulation and release of hepatic XO, suggesting XO as a potential mechanism in related vascular impairment.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #35**

**Associations Between Child COVID-19 Vaccine Uptake and Medical Mistrust  
among Black/African Americans**

**Kalo C. Sokoto, MA, Gwendolyn Dzwil\*, Jamey T. Brumbaugh, BS, Aliyah Pugh\*, Jaliyah Hubbard\*,  
Linda A. Alexander, EdD, and Daniel W. McNeil, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Public Health

African Americans have had hesitancy towards the medical community after the infamous Tuskegee Syphilis Trials of the twentieth century. It is uncertain whether this mistrust is still as high as it was many years ago, especially pertaining with the COVID-19 vaccine. Knowing that African Americans have had a history of being burned by medicine, it is easy to see that they would not be quick to trust a new vaccine for the coronavirus outbreak. The goals for this research are to find out how many African Americans do not trust the COVID-19 vaccine and to see how we could convince them to receive it and begin to gain back the trust that was broken in the nineteen hundreds. We used a qualitative survey to test the hypothesis that was answered by about five hundred people. The survey asked about where people get their information from as well as their level of trust with their medical providers. Our main findings show that a quarter of participants would not receive the COVID-19 vaccine and around a quarter would not give their child the vaccine either. This supports our initial hypothesis that vaccine hesitancy in the United States is still persistent among African American populations. Our funding is through the West Virginia University Eberly College of Arts and Sciences Racial Justice Grant.

**Funding:** West Virginia University Eberly College of Arts and Sciences

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #36**

Comparative Health Benefits of Reduced Exertion High Intensity Interval Training  
with an Aquatic Emphasis

**Elijah Smith\*, Lori Sherlock, Ph.D., Miriam Leary, Ph.D., and Brian Leary, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology (Health Track)

Reduced exertion high intensity interval training (REHIT) is a novel form of High intensity interval training (HIT). Protocol is a ten-minute modified wingate 3 times a week. It is a proven method for enhancing health including a better body composition, lowered blood sugar, decreased blood pressure, and improved Vo2 max. Despite the efficiency and effectiveness of HIIT, a large portion of people still do not work out. The main proponent for not engaging in physical activity has been linked to a lack of time, sedentary individuals not being able to keep up with the intensity of certain workouts, as well as chronically injured, such as the elderly, where exercise can be considered dangerous. REHIT is extremely time efficient. Findings from the 18 articles reviewed suggest that 30 minutes of REHIT a week is an effective form of exercise. We have taken the concept of REHIT and put it in the water with a protocol of ten minutes 3 times a week with squat-jumps. In a randomized pre-test post-test 8-week study, two groups of sedentary college students were recruited to compare the effectiveness of REHIT in water to on land. Participants performed a pre assessment before beginning the 8-week trial and post assessment after its conclusion. The goal is to show that the two modes of REHIT are effective and comparable in their level of impact. The study will demonstrate that aquatic-based training can be another avenue in the rising REHIT protocols, and give busy, injured, and sedentary people more options.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #37**

Chronic Stress Increases the Production of Xanthine Oxidase in the Liver of  
C57BL/6J Mice

**Phillip Englund\*, Emily Burrage, Saina Prabhu, James Frazier, Tyler Coblenz, and Paul D. Chantler,  
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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology

Chronic stress can be correlated with an increased risk of various vascular diseases. Past work in the lab has shown that chronic stress induces cerebrovascular dysfunction possibly caused by an increase of oxidative stress. One possible source of this oxidative stress is Xanthine oxidase. Xanthine oxidase is an enzyme that is found in high quantities in the liver. We hypothesize, that during times of high stress and inflammation Xanthine oxidase is upregulated in the liver and overflows into the vascular tissue, producing superoxide that binds to vessels inflicting damage. This study focuses on making a connection between Xanthine oxidase production in the liver and its role in chronic stress. This was accomplished by conducting an 8-week unpredictable chronic mild stress protocol (UCMS) on mice that received drinking water that was and was not treated with 50 mg/L febuxostat (Xanthine oxidase inhibitor). The mice were euthanized after the conclusion of the 8-week UCMS protocol, and the amount of Xanthine oxidase produced in the liver was quantified using western blots. Analysis of the data collected from the western blots showed that there was an increase in production of Xanthine oxidase in stressed mice compared to mice that were not stressed. Furthermore, there were no significant differences in mice that were stressed and treated with febuxostat and mice that were stressed and not treated with febuxostat. These data suggests that Xanthine oxidase does have a role in the vascular damage associated with chronic stress.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #38**

**Passive Stride-Length Limiting Orthosis Cause Gait Asymmetry and Sensorimotor Adaptation in Humans**

**Emily Herrick, Aliyah Lada\*, and Sergiy Yakovenko, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology

Chronic limb asymmetry during locomotion can lead to musculoskeletal trauma. Minimizing locomotor asymmetry through targeted training can prevent negative outcomes. We used sensorimotor adaptation in healthy volunteers to study how to induce and manipulate stepping asymmetry within a session of walking on a split-belt treadmill. We hypothesized that a wearable orthosis limiting the stride length of one leg and imposing asymmetric unloading would cause persistent locomotor asymmetry, measured with the asymmetric index for stance phase duration. We have also hypothesized that the reversal of asymmetry would increase the rate of symmetrical gait recovery. A group of healthy adults ( $N=12$ ,  $25.6 \pm 8.1$  years) walked on a treadmill in three conditions: unconstrained (control), constrained (left or right), and washout unconstrained. Limb loading asymmetry was monitored with ground reaction force sensors instrumented under each belt of the treadmill. Constrained walking for over 10 min caused the persistent asymmetry ( $p < 0.001$ ). However, the reversal of preference did not have a significant effect on the recovery rate ( $p = .094$ ). This indicates that the reversal of locomotor asymmetry in lower limb dynamics may not be analogous to the use of constraint-induced therapy targeting upper limb asymmetries. Overall, we demonstrate a novel framework for future studies of motor adaptation for gait rehabilitation programs.

**Funding:** NIH R03, Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #39**

**The Appalachian Mind Health Initiative.**

**Grace Udah\*, Robert Bossarte, Ph.D., Tyler D. Webb MSW, and Krista Foutrakis**

*WVU Injury Control Research Center, West Virginia University, Morgantown, WV 26505*

**Broad category:** Health Sciences

**Presenter's major:** Public Health

Anxiety and depression have become a huge public health issue especially during the COVID-19 pandemic. This increase is associated with isolation, loss of jobs and shelter. This study seeks to identify mental health issues and test online treatments among individuals in the rural areas, where there is a limited access to clinical care, and assess how well different treatments options work for patients with major depressive disorder (MDD). Participants from rural areas complete a comprehensive online survey that assesses their symptoms as well as personal characteristics, history and preferences. Participants will be randomly assigned to different online treatment modules using a Harvard University-developed model, which accounts for any imbalances that could skew the results. Participants showing no signs of anxiety or depression will be assigned to a module focused on resilience and well-being. The first meaningful results are expected in about three months. Dr. Robert Bossarte hopes the data generated by the study can be used to inform an algorithm that predicts which patients are likely to find success with online cognitive behavioral therapy. Previous studies have focused on genotyping – rather than self-reported personal information – to see what treatment approaches are likely to work best. Dr. Bossarte says "what makes us different from everything else that's going on out there is we're not just interested in knowing whether these platforms work. That's a question that we're interested in answering, but what we're really interested in is getting the best solution to each person as soon as possible."

**Funding:** Patient-Centered Outcomes Research Institute, Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #40**

Developing Virtual ARAT Rehabilitation Tasks and Assessing Performance in  
Virtual vs Real Environments

**Nisa Rana\*, Matthew Yough, B.S., and Valeriya Gritsenko, Ph.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Biology

In today's society, patients with strokes, amputated limbs, and various other neurological injuries are faced with a long road to recovery where they will often have to relearn basic tasks. A common method of assessing upper extremity performance is a task called the Action Research Arm Test (ARAT). The ARAT measures limb performance through a series of arm movements that evaluate the coordination, dexterity, and overall function of a subject's limbs. We used a point-based scoring system and timer to assess the hand, wrist, and forearm mobility of our test subjects. We replicated the ARAT grasp subtask in both a physical and virtual reality (VR) environment to compare the performance in both conditions. Our healthy subjects picked up a series of objects of varying shapes and sizes and placed them on a higher platform. We scored them based on the time they took and how well they carried out the movements. Based on the data compiled, we analyzed their performance in both environments. Our results indicate that the VR environment provided an accurate representation of the real ARAT. While it had a minor learning curve, the performance of the subjects in the VR learning environment matched closely in their times and abilities to complete the tasks. Therefore, through virtual reality, we hope to provide a fun and flexible means of rehabilitation by revolutionizing and simplifying effective physical therapy techniques to help those with impaired limb performance.

**Funding:** NIH, National Science Foundation, and Department of Defense

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #41**

**Nano-Titanium Dioxide Inhalation-Induced Oxidant Production Associates with  
Placental and Pup Insufficiencies**

**Alexandria Lusk\*, Krista Garner, Julie Griffith MSc, Kallie Schafner\*, Eric Kelley Ph.D., Tim Nurkiewicz  
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**Broad category:** Health Sciences

**Presenter's major:** Exercise Physiology

Advanced materials are being incorporated into a growing list of industrial and consumer products. Thus, there is an increasing risk of occupational and consumer exposure. Understanding maternal-fetal health outcomes incurred by inhalation of advanced materials, like nano-titanium dioxide (nTiO<sub>2</sub>), is a continuing focus of Environmental Health Safety. Previous work in nTiO<sub>2</sub> dams identified developmental abnormalities. Distribution of nutrients by the placenta and fetal liver are intrinsic to healthy development. Therefore, we hypothesized that maternal nTiO<sub>2</sub> inhalation would alter placental and fetal liver mass (surrogates of function) accompanied by increased oxidant production. Pregnant Sprague-Dawley rats were exposed to air or nTiO<sub>2</sub> (concentration 12±0.5mg/m<sup>3</sup>, cumulative lung burden 525±16µg) for 6 nonconsecutive days, with assessments on gestational day 20 (day before birth). nTiO<sub>2</sub>-dams had smaller litters compared to air control (11±1 vs 9±1pups). Previously, we found decreased nTiO<sub>2</sub> pup mass, but that was not observed in this small cohort. However, independent of sex, both placental efficiency (pup mass/ placental mass) and normalized fetal liver mass was decreased in nTiO<sub>2</sub> (0.09±0.001 v. 0.07±0.001 mg/body mass). This indicates possible maternal-fetal nutrient exchange impairments. Over-production of oxidants commonly associates with tissue impairments. Therefore, we measured H<sub>2</sub>O<sub>2</sub> production by cuomarin boronate in placenta and fetal liver. Maternal nTiO<sub>2</sub> exposure caused a 3-fold and 20-fold increase in H<sub>2</sub>O<sub>2</sub> production in the placenta and fetal liver, respectively. In summary, results indicate an association between placental inefficiencies, liver development, and oxidant production. Future research is aimed at interrogating the causal role of oxidant production in maternal nTiO<sub>2</sub> inhalation.

**Funding:** NIH

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #42**

Understanding Radiation's Potential in Drug Delivery Across the Blood-Brain  
Barrier

**Morgan J. Glass\***, Kathryn E. Blethen, Leland E. Earp, Samuel A. Sprowls, Ph.D., and Paul R. Lockman,  
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**Broad category:** Health Sciences

**Presenter's major:** Biochemistry

Effective treatments for brain metastases of breast cancer remain limited largely because of the blood-brain barrier (BBB), a protective mechanism which prevents potentially dangerous molecules from entering the brain through the bloodstream. Unfortunately, this barrier restricts accumulation of most chemotherapeutics in brain tumors. The brain's capillaries are highly specialized with a foundational layer of endothelial cells adhered together with tight junction proteins, which restrict passive permeability. Additionally, efflux transporters kick out molecules attempting to cross the BBB. Overall, the BBB limits drugs successful in treatment of peripheral cancers from penetrating brain cancer at cytotoxic concentrations. Literature and clinical data suggest radiation therapy induces temporary integrity changes at the BBB, allowing for increased passage of chemotherapy into brain tumors. Interestingly, effects of radiation-induced disruption at the molecular level are not fully understood. To determine the effect of radiation at clinically relevant doses, dosimetry was performed, and treatment verified using our small animal irradiator. Brain capillaries were isolated from mice treated with whole-brain radiation therapy, and principal barrier proteins were measured via Western Blot to evaluate radiation's effect at the molecular level. Preliminary data supports the predicted downregulation of specific barrier proteins: occludin, claudin-5, and P-gP. Brain tissue samples exposed to fluorescent tracers at varying concentrations were imaged and standard curves were generated to validate future in vivo permeability studies. While radiation remains an important tool for the treatment of brain metastases, further study of its effects on the physiological dynamics at the BBB is crucial, especially in its implications for drug-delivery.

**Funding:** National Institute of Aging at the NIH (#T32 AG052375)

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #43**

**The Regulation of Interferon Signaling and Viral Replication by GRHL2**

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**Broad category:** Health Sciences

**Presenter's major:** Management Information Systems

In humans and other organisms, the Grainy head-like genes (GRHL) influence a number of different biochemical reaction, pathways, and processes. With regard to humans, the GRHL genes are crucial to repair and development of epithelial tissues and epidermal barriers. To understand this further, a cell line with GRHL knockout (SG2) was compared to a cell line still expressing GRHL genes (Mcf10a-neoT) through the exposure of viral infection and poly(I:C) double stranded RNA used as the primary inducer. The poly(I:C) triggers an immune response within the cells in order to activate interferon pathways, the pathways which are being investigated. The differences in interferon response has been documented and analyzed through real time PCR and Western blotting. Interferon stimulated genes such as interferon regulatory factor 3 and phosphor-interferon regulatory factor three are the primary quantifications for part of this investigation. So far, insight has been also brought to the important of GRHL genes and their role in cell surface proteins and their expression during an immune response. It has also been shown that in wild type cells, inferno responses are stronger and longer lasting than the knockout cells. The wild type cells have also shown a stronger resistance to epithelial mesenchymal transition induced from TNF-beta, ultimately supporting the hypothesis that GRHL genes play an important role in mediating immune response and combatting illnesses such as cancers of the breast and skin.

**Funding:** Department of Biochemistry

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #44**

**Cultural Knowledge and Perception of Cancer and Cancer-Healthcare Among  
Residents of Rural West Virginia**

**Bryan Hill\*, Susanna Donaldson, Ph.D., and Ann Morris, M.D.**

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**Broad category:** Humanities

**Presenter's major:** Anthropology and History

West Virginians experience suboptimal health outcomes, including above-average cancer rates. Previous studies suggest that cultural factors may explain this phenomenon in low-income, uneducated populations. Few ethnographic studies among rural Appalachians have been done to support these assumptions. In this study, we plan to answer these questions: What is the cultural knowledge about cancer and cancer healthcare (treatment and what is involved in treatment) among residents of rural West Virginia? What are the cultural perceptions of cancer and cancer healthcare among residents of rural West Virginia? We take an Ethnographic method approach by performing interviews and collecting data using free listing activities and pile sorting activities. This project has two aims (1) to identify patterns in the perception of and knowledge about cancer among rural residents of West Virginia and (2) to explore perceptions of and knowledge of cancer among rural residents of West Virginia to those of West Virginians living in an urban setting. Ultimately, our goal is to use information gained via this project to improve communication between patients and healthcare professionals.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #45**

**Exploring Sibling Communication**

**Matthew Witkowski\*, and Christine Rittenour Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Communication Studies

The purpose of this study is to examine potential areas of conflict within sibling relationships, and how the conflict can affect the relationship, and each sibling. This study will look particularly at perceived parental nurturance, need for privacy, and perceived levels of inclusion as potential areas of conflict, and factors that influence sibling-to-sibling relationships. Surveys were administered to participants consisting of Likert Scales and Likert Type scales to assess participant attitudes and behaviors dealing with the aforementioned areas. Participants were gathered from amongst the West Virginia University student body. The results from this study should help us to establish correlations between levels of conflict amongst siblings and perceived parental nurturance, levels of conflict amongst siblings and a need for, or violation of privacy, and levels of conflict amongst siblings and perceived levels of inclusion by their siblings. Establishing these relationships would allow us to guide future research about conflict between siblings, and allow for families to better identify and navigate areas of conflict between siblings. Data is being gathered and is to be presented during the RAP Fall 2021 Symposium.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #46**

**Environmental Music Therapy to Support Healthcare Professionals: A Response to Increased Burnout During Covid-19**

**Kathryn Roe\*, Maria Ducci, MT-BC, Maribeth Vain, MT-BC, and Hannah Ivey-Bush, MM, MT-BC**

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**Broad category:** Social Sciences

**Presenter's major:** Music Therapy

Burnout can be a serious effect deriving from an intense and stressful work environment. Decreasing burnout in healthcare professionals is important as it will not only improve the quality of patient care provided, but the mental and physical states of those struggling with burnout. Music therapy is a multifaceted profession that can tend to the needs and presenting signs of burnout. In our study, we will be providing music therapy to the health professionals of Ruby Memorial Hospital in Morgantown, WV. While all staff are included, an emphasis is being placed on staff providing care for covid patients. Music therapy services will be provided by the music therapy team to staff several times a week after which they are invited to take a brief survey. The interventions will consist of client preferred music, fingerpicking techniques on guitar, and lyrical content related to improving mental health. Our research consists of data collection and will be compiled to find relevant signs of decreased levels of anxiety and work-related stress. From the sessions performed, positive verbal statements celebrated the effect of music therapy. Projected goals consist of decreasing signs of intense stress and burnout of the healthcare workers at Ruby and comparing results of different timelines of the virus and vaccination status in WV. Another goal is to continue to build medical music therapy and provide valuable information on staff wellness for other programs.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #47**

Comparing Pre-Treatment Compliance Rates Between PCIT and PCIT-Toddler  
Using DPICS

**Gabrielle M. McDonald\*, Miranda N. Signorelli, Lindsay R. Druskin, B.A., Samantha Holbert, Kelsey Keen, Natalie E. Watson, Christopher K. Owen, M.S., Robin C. Han, M.S.Ed., Sharon Phillips, M.A., Jane Kohlhoff, Ph.D., and Cheryl B. McNeil, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Psychology

Parent-Child Interaction Therapy Toddler works to improve upon the relationship between a parent and their toddler by decreasing negative behaviors and improving compliance (Girard et al., 2018). PCIT-T consists of two primary phases: Child-Directed Interaction for Toddlers (CDI-T) and Parent Directed Interaction for Toddlers (PDI-T). The parents and children are both coded using the Dyadic Parent-Child Interaction Coding System (DPICS) measure (Eyberg et al., 2013). The DPICS is used to code and understand the communication and behaviors taking place between both the parent and child. The different coded categories include Parent Codes, Child Codes, and Compliance Codes. We hypothesized that PCIT-Toddler will be an efficacious intervention for toddlers with behavior problems and their parents. The participants for the study consisted of 86 parents and their toddlers aged from 12 to 24 months (Kohlhoff et al., 2020). The toddlers were clinically referred for behavior problems to the early intervention clinic in Sydney, Australia, where they had received a grant to conduct their research. The data used has already been funded and completed. To ensure accuracy, the archival data was double coded by two independent teams. Once coding and data entry were completed, the results were entered into SPSS where descriptive statistics and t-tests were conducted. An analysis of child compliance was used to determine the efficiency of PCIT-T by comparing the results to the findings of children 2-7 years who were referred for standard PCIT. This project was submitted and accepted at the PCIT-International virtual 2021 conference.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** EXCEL and WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #48**

Literature Review on HPV Vaccine Perceptions Among Hispanic Populations

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**Broad category:** Social Sciences

**Presenter's major:** Journalism

The Human papillomavirus (HPV) vaccination, which is available for 9–26-year-olds, is essential to prevent several types of cancers in both males and females. Despite importance, vaccine uptake is low, and Hispanics are among the minority groups who are not taking the vaccine, especially those who find themselves in rural communities. This study will conduct a systematic comprehensive literature review about the Hispanic population in rural areas to further understand beliefs, perceptions, attitudes, knowledge, and behaviors surrounding the HPV and HPV vaccination. The literature review will aim to synthesize existing knowledge and to provide critique and suggest methods to reach those in the Hispanic community and provide evidence-based communication recommendations. Recommendations about ideologies and beliefs could be used to create material like posters, pamphlets, and ads, that will be adapted to be efficient communication tools to reach Hispanics. Within the literature review it was found that English-speaking Hispanics had more understanding of where to access the HPV vaccine and had more awareness about the serious implications that can come from HPV. Hispanics in rural areas are more unwilling to share personal information, hindering access to medical care, and leading to less HPV vaccine access. As a result, communication methods that reach out to both Spanish and English-speaking Hispanics are recommended. With more efficient communication methods, HPV vaccine uptake should see an increase within the Hispanic community. Such findings and recommendations could be applied to other minorities within WV and Appalachia, leading to a healthier population.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #49**

Associations between Parenting Factors and Instances of Physical Touch with  
Toddlers

**Amelia Godwin\*, Lindsay R. Druskin, B.A., Kelsey Keen\*, Erinn Victory, B.A., Jane Kohlhoff, Ph.D., and  
Cheryl B. McNeil, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Psychology

Stress has been shown to increase negative parenting behaviors (Crnic et al., 2005), which can have lasting impacts on child behavior and socioemotional development. Aversive experiences associated with child abuse, such as negative physical touch, may also have negative physical and psychological effects on children (Felitti et al., 1998). Since a lack of positive parental touch can negatively affect children as they grow (Field, 2002), it is important to examine whether parental stress and child abuse potential may be risk factors for decreased positive physical touch. The current study aims to assess whether high parental stress and child abuse potential are associated with fewer instances of positive touch and more instances of negative touch. I hypothesize that parents with a higher level of reported stress will exhibit more negative touch and less positive touch. I also hypothesize that parents who are at risk for child abuse will exhibit more instances of negative touch. Participants include parents and their toddler-aged children seeking treatment in a larger randomized controlled trial examining Parent Child Interaction Therapy-Toddler. Parents completed the PSI-SF (Abidin, 2012) and the BCAP (Ondersma et al., 2005) at the pre-treatment assessment. The DPICS (Eyberg et al., 2013) was used to assess for positive and negative touch. An independent samples t-test revealed no relations between parental stress and touch. However, children of parents at high risk for child abuse exhibited significantly more negative touch than children with parents not at risk.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #50**

Parent Emotion-focused Practices and Child Emotion Regulation in PCIT with  
Toddlers

**Nicholas Hatcher\*, Christopher Owen M.S., Sophia Shank\*, Lauren Browning\*, Lindsay Druskin B.A.,  
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**Broad category:** Social Sciences

**Presenter's major:** Biology

A recent systematic review and meta-analyses by Zinsser et al. (2021) has found that certain parent-child emotion practices influence child emotion regulation skill development. Developing a system to classify emotions can add to the growing evidence that Parent-Child Interaction Therapy with Toddlers (PCIT-T) can improve a child's emotional regulation. Young children depend on their parents for emotional regulation, and since PCIT has shown to reduce a child's disruptive behaviors and foster warmer parent-child interactions, a correlation between the two factors could be discovered (Leslie et al., 2012). The Dyadic Emotion Coding System (DECS) is a behavioral observation measure created to capture a variety of parent-child emotion-focused practices and emotional content in PCIT-T. The Devereux Early Childhood Assessment (DECA; LeBuffe et al., 2009) is a parent-report measure designed to capture the social, emotional, and behavioral concerns present in infants and toddlers. To assess child emotion regulation, DECA will be used. Utilizing data from a 90 parent-toddler dyad sample in conjunction with the DECS, PCIT-T's effectiveness for emotion regulation can be understood using both pre- and post-treatment groups. At baseline, we hypothesize that DECS codes and composites will be associated with child emotion regulation; specifically, adaptive DECS codes and composites will be associated with better child emotion regulation (Zinsser et al., 2021). Exploratory analyses will also investigate pre- to post-treatment changes on DECS codes and composites as well as child emotion regulation. This would provide evidence for PCIT-T as an effective intervention for improving parent emotion-focused practices and child emotion regulation.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #51**

Joint Engagement in Children with Autism Spectrum Disorder after First Phase of  
PCIT

**Emily Aman\*, Kelsey Keen\*, Robin Han, MEd, Suzi Naguib, PsyD, Rachel Piper, MSW, and Cheryl McNeil, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Neuroscience

Joint engagement can be defined as two individuals attending to a common object or topic (Bakeman & Adamson, 1984). Children with autism spectrum disorder (ASD) have been found to have deficits in social interaction, including coordinated joint engagement (Adamson et al., 2009). Parent-Child Interaction Therapy (PCIT) is an evidence-based behavioral parent training program that aims to increase compliance and reduce disruptive behavior in young children ages 2-7 years (Eyberg & Funderburk, 2011). PCIT has demonstrated effectiveness in reducing disruptive behavior and improving parenting skills for children with ASD. Additionally, preliminary evidence suggests that PCIT may be an effective treatment in improving social deficits associated with ASD (Lieneman et al., 2019; Parlade et al., 2020). The current study seeks to examine the effect of the first phase of PCIT, Child-Directed Interaction (CDI), on joint engagement for 11 children with ASD. In CDI, caregivers are instructed to follow their child's lead and use positive parenting skills to reinforce appropriate behaviors during a free-play dyadic interaction. Joint engagement was measured in two ways: (1) using an observational coding scheme created by Adamson et al. (2000) and (2) an observer-rating scale called the Joint Engagement Rating Inventory (JERI; Adamson et al., 2012). Thus, it is hypothesized that parent-child joint engagement will improve upon completion of CDI. Wilcoxon signed-rank tests will be used to examine pre-post changes in joint engagement. Results, implication of findings, and future directions will be discussed.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #52**

Varying Quality of Attention Impacts Student Hand Raising: A Single-Case  
Evaluation

**Amina Boukhris\*, Olivia Harvey, Marisela Aguilar, Jessica Benevides\*, and Claire St. Peter, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Psychology & Biology

Although several effective classroom-management practices rely on ignoring challenging behavior, this is not always possible. Therefore, it is useful to explore ways that teachers can continue to attend to challenging behavior but also increase rates of appropriate alternative behavior in the classroom. The current study manipulated the quality of attention on rates of student talking and hand-raising to determine if providing higher-quality attention for one response increased that response. The participant was a 7-year-old male who talked out in class. We manipulated the quality of attention (rule/help reminders) provided after talking out and hand-raising while controlling the duration, delay, and the frequency of attention. During baseline phases, 30-s of help attention were provided for each hand-raise and 30-s of rule reminders were provided for each instance of talking out. These consequences were reversed across phases in ABA reversal design. The rate of hand-raising and talking out were dependent variables. During baseline, hand-raising increased and talking out decreased. During the contingency reversal phase, talking out increased while hand-raising decreased. Teachers could use the results of the current study to improve and create behavior interventions plans for attention-related problematic behavior when ignoring those responses is impractical.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** N/A



**Presentation #53**

**Differential Reinforcement of Hand Raising Also Reduces Talking Out in  
Classrooms**

**Jessica Benevides\*, Olivia Harvey, Marisela Aguilar, Amina Boukhris\*, and Claire St. Peter, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Psychology

Previous research has suggested that different types of attention can affect the rate at which problem behavior occurs. These findings are important for classrooms, where teacher attention is a valuable and inexpensive resource. In the present study, we manipulated the quality of attention to understand its effects on a participant's rate of hand raising and talking out during independent work in the classroom. The participant was a 7-year-old male in an alternative-education program. Across phases, we manipulated the type of attention (help or rule-reminders) following appropriate and problem behavior. The duration (30-s), delay (0-s), and schedule of reinforcement (continuous) were controlled. During baseline, help was provided for hand raising, and hand raising occurred at higher rates than talking out. During the contingency reversal phase, during which rule reminders followed hand raising, talking out occurred at higher rates than hand raising for most of the phase. Teachers should consider the quality of attention provided to students to reduce problem behavior in classrooms.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #54**

The Effects of Reward-Related Sensory Game Features on Simulated Online  
Gaming

**Alik Assi\*, Margaret Crow\*, Mario Ferrari, M.A., Luke Clark, Ph.D., and Mariya V. Cherkasova, Ph.D.**

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**Broad category:** Social Sciences

**Presenter's major:** Neuroscience

One of the prominent features of casino and online gambling machines are the static and dynamic visuals and sounds, which accompany winning outcomes. These audiovisual features are becoming increasingly prominent in gambling products such as slot machines, however, there has been little research into the psychological effects of these sensory stimuli. When added to a laboratory gambling task, these stimuli have been seen to induce risk taking behavior as well as arousal. However, it is unclear whether these findings generalize to naturalistic gambling. In this study, we evaluated the effects of audiovisual game features on betting behavior and game experience in novice versus experienced online gamblers. Participants recruited via Amazon Mechanical Turk were randomly assigned to complete 200 spins on one of two versions of a highly realistic slot machine simulator online: one version included win-accompanying audiovisual features; the other version presented no such audiovisual features. Participants additionally answered questions about their gambling involvement and their experience playing the game. Although the presence of the audiovisual features did not affect the self-reported experience of the game, it promoted loss chasing in experienced gamblers: participants placed higher bets when losing, and this tendency was amplified in the presence of the sensory features in experienced gamblers. Because loss chasing is considered a hallmark of the transition from recreational to compulsive gambling, our findings raise concerns about potentially harmful effects of these features on the players and have implications for policy on regulation of audiovisual features in gambling products.

**Funding:** West Virginia University

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #55**

**Resurgence on Conditioned Behavior**

**Ethan Schneider\*, Firdavs Khaydarov, and Kennon Lattal, Ph.D.**

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**Broad category:** Sciences

**Presenter's major:** Psychology

The purpose of this study was to evaluate variables contributing to resurgence, which is the recurrence of previously learned behavior when a more contemporary response no longer produces reinforcement. Four male White Carneau pigeons first were trained to respond repeatedly on an average of 40 times to produce access to food, a variable-ratio 40 schedule of reinforcement. Following this, in an alternative reinforcement phase, reinforcement for the original response was discontinued and a second response was reinforced under two different conditions. In one, a 100- msec response-dependent key light stimulus change (a conditioned reinforcer) preceded reinforcement. In the other no such stimulus appeared following the reinforced response. Subsequently, in a resurgence test phase, reinforcement for the original response and alternative response were discontinued, but responses in the conditioned reinforcement condition continued to produce the brief key-light change. In the first two phases, response rates were high when a response was reinforced and low when it was not. The target-response rates for the 4 subjects were initially high during the beginning of resurgence test phase, but decreased to near zero response rate toward the end. In the study, differential resurgence as a function of the presence or absence of conditioned reinforcement did occur during the resurgence test phase.

Keywords: training phase, response rate, resurgence, alternative reinforcement, variable ratio

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #56**

**The Effects of Mothers Substance Use Disorder on Neonates**

**Katheryn Hetman\* and Roger Carpenter, Ph.D.**

*School of Nursing, West Virginia University, Morgantown, WV 26506*

**Broad category:** Social Sciences

**Presenter's major:** Nursing

The purpose of this research was to learn about mothers faced with substance use disorder and discover the facilitators and barriers of their addiction. West Virginia is amid a substance use disorder pandemic, leaving many children without mothers. Additionally, many infants are forced to combat physical and psychological disabilities on their own. A literature synthesis and review were conducted to discover appropriate resources for research papers. Several databases were searched, including but not limited to CINHALL, PubMed, EBSCO Host, Health Source, and Medline. To find relevant articles, a variety of keyword combinations were used. The first research paper discussed the exploration of the biological, social, and environmental factors that leads to the unique needs of women with substance use disorder. A total of 3,403 relevant journal articles were compiled and five specific journals were used for the first research paper. It was discovered that the main issue to focus on was the biological factors that lead to mothers being faced with addiction. Biological factors affect a person no matter what guidelines or interventions are put into place and it is very difficult to control these. Social and environmental factors can be better controlled with interventions that are put into place, but it is very hard to change a person's biological makeup. Ultimately, it was discussed that by addressing executive and reflective functioning, professionals can more effectively understand a person's biological issues.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #57**

**The Impact of the COVID Pandemic on Survivors of Violence**

**Sarah Smith\***

*Center for Community Engagement, West Virginia University, Morgantown, WV 26506*

**Broad category:** Social Sciences

**Presenter's major:** Child Development and Family Studies and MDS

The COVID-19 pandemic has been a life altering experience for just about everyone, but for some it has affected them in ways no one would have imagined. Survivors of violence are commonly left in the shadows of everything - unless their stalker, abuser, etc. is in jail, deceased, or far enough away from them that the survivor feels safe, they typically are forced to avoid photos, social media, and other recorded types of events that could put them in danger by publicizing their location or activities. As the COVID pandemic continued to grow, so did the use of technology in just about every aspect of life. This became a problem for survivors of violence, as mandatory interaction with these types of programs and software usually had alternative in-person options or the technology was something that everyone was familiar and comfortable enough with to understand how to keep themselves on the platform. When programs like Zoom became a basic necessity for just about anyone in any job to get by, survivors of violence were left with very little options as to how to get by. If a Zoom session was being recorded, they could not attend. If a ceremony was being live streamed and accessible to anyone, they could not attend. This presentation aims to address and bring attention to the issues, as well as discuss possible solutions.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #58**

Distance to Care Analysis: Determining Accessibility of Children's Mental  
Healthcare in Rural West Virginia

**Ashley Sheree\*, Erin Hudnall, Jennifer Ludrosky, Ph.D., and Wood-Turner**

*Health Sciences Center, West Virginia University, Morgantown, WV 26505*

**Broad category:** Social Sciences

**Presenter's major:** Sociology

Previous research has shown that access to healthcare may be limited in rural communities, such as those in West Virginia (Douthit et al., 2015). A lack of access to behavioral health services is related to a rate of diagnosable mental health issues of up to 20% for children (Boydell et al., 2006). This study utilizes a distance analysis based on secondary data from patient intake forms to determine the average distance and time to child mental health care services. Zip codes from these forms are used to calculate travel time and distance to a healthcare facility using Google Maps to determine accessibility of child mental healthcare in the rural state of West Virginia. Results showed the average travel time for patients to be 71 minutes. The average travel distance for patients was 63 miles. The total sample size was 115, and the furthest distance traveled was 220 miles. Therefore, access to healthcare in rural communities is both a necessity and a scarcity.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #60**

**Observing and Measuring Behavior in Persons with Dementia Using the Greater Cincinnati Well-Being Tool**

**Carmen Thomassy\* and Michaela Clark, M.S.**

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**Broad category:** Social Sciences

**Presenter's major:** Psychology

Dementia refers to a group of medical symptoms that results in the decline of many cognitive abilities and interferes with daily functioning. Dementia can pose a challenge for both the individual and their caregivers, so it is important to find activities that increases the individual's engagement with their surroundings. In this study, we used the Greater Cincinnati Well-Being Tool (GCWBT; Rentz & Kinney, 2005) to observe whether persons with dementia will have increased attention and engagement when using Appalachian-inspired materials compared with non-Appalachian materials. Previous studies have found that activities tailored to the individual's interests and abilities increase the amount of time that the participant actively engages in the activity presented. Thirty participants from the Appalachian region of West Virginia engaged in two sessions of Bingo games conducted over Zoom, one Appalachian-themed and the other non-Appalachian themed. Behavior was observed for ten minutes during which participants were rated on how often they engaged in the indicators for the GCWBT: interest, attention, pleasure, and negative affect. In order to train for coding behavior, raters met several times and practiced coding until all ratings reached at least an 85 percent agreement. To practice coding, raters watched pre-recorded videos of adults engaging in similar group activities. The importance of training raters to code behavior accurately and similarly in intervention research will be discussed. Additionally, Cohen's Kappa and Intraclass correlation coefficients for rater training will be presented.

**Funding:** N/A

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #61**

**Mare Reproductive Loss Syndrome**

**Heather Rubilla\***

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**Broad category:** Agriculture/Natural Resources

**Presenter's major:** Animal and Nutritional Sciences

Mare Reproductive Loss Syndrome (MRLS) was a period in 2000-2001 where 25% of all pregnant mares in Ohio Springs, West Virginia, Kentucky, and Tennessee experienced abortions. The cause was not caused by a disease or other agent, it was caused by something environmental. The purpose of the studies that will be focused on in this presentation is to determine what caused these abortions and the \$500 million in losses. These studies mainly focus on the Eastern Tent Caterpillar (ETC) which is believed to be the causative agent of MRLS. ETC are widely found in pastures that the mares graze upon. These caterpillars are hirsute, which means they have hairs on their bodies. The ingestion of the caterpillars caused abortions in many mares, supporting the hypothesis that ETC cause pregnant mares to abort. The hirsute are believed to create lesions in the digestive tract of the animals, allowing bacteria to infect and thus cause abortions. It is also believed that the ingestion of their excreta and larvae cause abortions.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #62**

**Pentesting Capture the Flag Activities on Virtual Machines**

**Logan Yokum\* and Thomas Devine, Ph.D.**

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WV 26506*

**Broad category:** Engineering

**Presenter's major:** Cybersecurity

The purpose of this research is two-fold: 1) to gain hands-on experience with methods and techniques used by cyber intruders to infiltrate protected systems, exfiltrate confidential data, establish persistence, and cover tracks, and 2) to encourage competition-based cybersecurity education by developing a Capture the Flag (CTF) activity. To accomplish these goals, we studied Linux operating systems and the phases of penetration testing in existing CTF activities. We then developed a virtual machine (VM) image to serve as a victim of potential "threat actors", which in this case are West Virginia University students participating in the CTF activity. We released the VM and directions to student volunteers for beta testing by ethically hacking the victim VM to search for and exfiltrate hidden "flags". A survey was created to evaluate their experience and offer suggestions to improve the activity. It is our hope that the development and release of this CTF activity will help the pentesting community at WVU remain contemporary and ensure that high-quality hands-on ethical hacking activities exist for cybersecurity education at WVU.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #63**

**3p Deletion Syndrome Case Report and Review**

**Yssabela Cabuyao\* and Utkarsh Kohli, M.D.**

*Health Sciences Center, West Virginia University, Morgantown, WV 26506*

**Broad category:** Health Sciences

**Presenter's major:** Neuroscience

3p deletion syndrome is a rare genetic syndrome wherein the terminal portion of the short arm of chromosome 3 is deleted. The phenotypic abnormalities associated with 3p deletion syndrome include widely spaced eyes, broad nose, high forehead, small jaw, and extra digits (fingers or toes). Additional phenotypic features include seizures or epilepsy, decreased muscle tone, hearing loss, feeding difficulties, vomiting, and congenital cardiac defects. Though congenital cardiac defects have been associated with this syndrome, cardiovascular involvement in patients with 3 p deletion syndrome remains poorly characterized. We report a 16 month-old female infant with 3p deletion syndrome who in addition to several other non-cardiac phenotypic features of 3p deletion syndrome including imperforate anus and crossed ectopia of kidneys, had complete common atrioventricular canal, single right coronary artery and isolated right upper pulmonary vein stenosis. She underwent successful repair of complete common atrioventricular canal at 7 months of age and continues to do well. She carries a 10 MB terminal deletion of the chromosome 3p26.3 to 3p25.3 and a 22 MB terminal duplication of the chromosome 4q32.3 to 4q35.2. This report is supplemented by a comprehensive review of cardiovascular involvement in patients with this rare syndrome.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #64**

**Gemini Telepresence Robot System Design**

**Trevor Smith\* and Yu Gu, Ph.D.**

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WV 26506*

**Broad category:** Engineering

**Presenter's major:** Mechanical and Aerospace engineering

Current telepresence robots are costly and only allow the operator to see the environment on a 2D screen and move around on a wheelbase. Thus, these telepresence devices are severely limited because of the high barrier of entry and the operator is unable to manipulate objects or easily perceive the world in 3D. Therefore, to address these gaps in capabilities, Gemini was designed to grant the operator the ability to manipulate objects, expand the human interface by putting the user in the 3D world with the use of a virtual reality (VR) headset, and be low-cost. The simplistic, low-cost, and intuitive controls of Gemini promote early adoption by businesses and medical personnel to grant increased telepresence needs. In addition, this platform can be utilized by robotics enthusiasts and university researchers studying humanoid robotics or human-robot interaction. This paper presents an overview of the Gemini robot's mechanical, electrical, and programmatic systems. Furthermore, the paper is concluded with remarks on future iterations of the project.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** EXCEL

**Presentation #65**

**Next-Generation Sequencing : The Future of Forensics**

**Oscar Enriquez\*, Sara Bodnar, B.Sc., and Tina Moroose, Ph.D.**

*Department of Forensic and Investigative Science , West Virginia University , Morgantown , WV 26505*

**Broad category:** Sciences

**Presenter's major:** Forensics

DNA has been an important part of the forensics field for decades. Unfortunately evidence collection and processing is still difficult. Sometimes that genetic data may be contaminated, or the lack of genetic data may leave a case going cold for months or years. Our colony is rapidly advancing , and what comes with such advancement is improved methods for DNA analysis. Massive parallel sequencing or Next-Generation Sequencing (NGS) analyzes multiple small pieces of DNA at one time . This in turn increases the amount of samples that can be processed at once while decreasing the time it takes to replicate the strands. One of the downsides to this process is it is better to process a large amount of data rather than a small amount due to cost. This would make it ideal for large laboratories that are testing hundreds of samples at a time. Up until now , common methods of sequencing data included Sanger Sequencing and Gel Electrophoresis. These methods lacked scalability and discovery power which are key aspects of DNA sequencing needed in the forensics field. The longer it takes to discover and replicate data , the more expensive it can become to a laboratory. The goal of this presentation is to explore the possibilities and advancements that NGS could bring to the table.

**Funding:** First2 Network

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #66**

**Effects of Aripiprazole on Risky Choice in Rats**

**Bethany Knight\*, Paige M. Currie, BS , and Karen G. Anderson, Ph.D.**

*Department of Psychology, West Virginia University, Morgantown, WV 26505*

**Broad category:** Sport Science/Psychology

**Presenter's major:** Biomedical Engineering

Aripiprazole is an antipsychotic used to treat psychological disorders, such as bipolar disorder and autism spectrum disorder (ASD). Aripiprazole's purpose is to reduce irritability and outbursts of anger in patients. However prior case studies have shown aripiprazole may be associated with increases in risky choice; specifically cases of developed pathological gambling have been reported. To test the association with risky choice, a series of choices were offered to rats in which one option is a smaller reward but always guaranteed, while the other is a larger reward, but becomes increasingly less likely to be received (aka probability discounting). Risky choice was classified as choice of the larger reward, particularly at low probabilities of the reward being received. Sessions were run under baseline conditions (no drugs being administered), with vehicle alone (DMSO), and under three different doses of aripiprazole. Accordingly, it was found that there was a modest increase in risky behavior due to aripiprazole in the rats. Furthermore, at higher doses, the rats appeared to be less sensitive to the magnitude of the reward, characterized by a flattening of the discounting function. For the next phase of the experiment, aripiprazole will be tested in combination with d-amphetamine, a drug prescribed in combination with aripiprazole for individuals with comorbid attention-deficit/hyperactivity disorder (ADHD) and ASD, to determine how it may affect risky choice.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #67**

Treatments and Comorbidities of Migraines in the Population of West Virginia

**Madison Menendez\*, Umer Najib, M.D., and Smailen Rodriguez Cueto, M.D.**

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**Broad category:** Health Sciences

**Presenter's major:** Neuroscience

Migraines are a common medical condition, and most people know someone who suffers from these painful headaches. The population of West Virginia is greatly affected by migraines, comorbidities associated with them, and the way these migraines are being treated. Migraines can be treated with abortive and preventative medication. While opiates do not actually specifically treat migraines, it is sometimes prescribed. We took a deeper look into the way migraines are treated by collecting data from over a thousand patients at the WVU Headache Center and looking at the type of migraine, type of medication prescribed, and any other health condition that person had. This data was collected from new patients at the headache center over the last two years. The purpose is to find out how migraines are being treated and what other health conditions are typically associated with people who suffer from migraines. The results are expected to show how migraines are being treated. The results will also look at how many different medications a person is on. Specifically, the prevalence of opiates being prescribed will be looked at and addressed. This is important because opiates are highly addict, and they should not be being prescribed solely for the purpose of treating migraines. The results should also show how often co-morbidities occur in people with migraines. Preliminary results and graphs will be further discussed in the presentation.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #68**

The Effect of Sheep Breed on Immune Cell Response to Lipopolysaccharide  
Stimulation in Vitro

**Kelly Hanlon\*, Denzel Middleton Ph.D., Scott P. Greiner Ph.D., and Scott Bowdridge, Ph.D.**

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**Broad category:** Agriculture/Natural Resources

**Presenter's major:** Animal and Nutritional Sciences

When studying differences in immune response to helminth parasites between parasite-resistant St. Croix (STC) sheep and parasite-susceptible Suffolk (SUF) sheep a series of single nucleotide polymorphisms (SNP) were discovered that changed the predicted protein structure of nod-like receptor pyrin containing domain 3 (NLRP3). Classical activation of NLRP3 occurs in response to lipopolysaccharide (LPS), a known pathogen-associated molecular pattern (PAMP), and NLRP3 is activated in response of this PAMP binding to toll-like receptor-4 (TLR4). To determine the effect of these SNP on NLRP3-dependent responses, peripheral blood mononuclear cells from both STC and SUF sheep were isolated from whole blood and stimulated with LPS for 3 hours. Additionally, to determine the role of NLRP3 in these responses samples were pre-treated with the NLRP3 inhibitor MCC950 for 2 hours before LPS treatment. After 3 hrs of incubation at 37°C cells were collected and RNA was extracted to analyze immune gene expression using qPCR. In response to LPS alone, STC sheep upregulated pro-inflammatory genes such as IL-1 $\beta$ , TLR4, and TNF $\alpha$ , whereas these same genes were either not expressed or down regulated in SUF sheep. The ablation of NLRP3 activity via addition of MCC950 effectively reduced pro-inflammatory gene expression in STC sheep to the level of SUF PBMC stimulated with LPS alone. Taken together, these data demonstrate that impaired functionality of NLRP3 in SUF sheep which may have serious implications on discovery of generalized impaired immune function in this breed to a variety of pathogens.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #69**

**Muskrat Response to Olfactory Stimuli**

**Daniel Bryan\*, Josh Peplowski, and Sheldon Owen**

*Davis College of Agriculture, West Virginia University, Morgantown, WV 26506*

**Broad category:** Agriculture/Natural Resources

**Presenter's major:** Wildlife and Fisheries Resources

Currently, there exists very little information regarding muskrat responses to introduced scents and other olfactory stimuli in their environment. When trapping or surveying muskrats it is relatively unknown whether artificial lures or scents invoke a response. This study is designed to determine muskrat response to introduced scents in their environment. We will use motion activated cameras to measure muskrat reactions to apple oil, muskrat musk glands, persimmon oil, apple slices, and carrots. We will apply these lures to constructed floats and place a motion activated camera to record activity. These floats are used to eliminate any coincidental sightings. Using the data collected from the cameras, we hope to determine the olfactory response of different stimuli based on muskrat site visitation. This study will be conducted in known muskrat ponds in Preston County WV and repeated in known muskrat habitat in Greenbrier County WV. At the time of writing, we are still in the process of data collection, however I expect to find strong muskrat attraction to multiple stimuli with muskrat scent glands likely having the highest response rate. The results of this study can be used to improve future muskrat trapping and survey techniques by enabling reliable comparisons between muskrat lures and induced response rates.

**Funding:** Federal Work Study

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #70**

**A Study of Gunshot Residue Prevalence in the General Population of  
Morgantown, West Virginia**

**Jessica Friedel\*, Korina Menking-Hoggatt, Ph.D., and Tatiana Trejos, Ph.D.**

*Department of Forensic and Investigative Science, West Virginia University, Morgantown, WV 26506*

**Broad category:** Sciences

**Presenter's major:** Forensic Chemistry

Examination of gunshot residue (GSR) can provide information in firearm-related investigations. However, to address if residues originated from the discharge of a firearm, studies on the prevalence of particles that may mimic GSR are needed. Prevalence studies are required to establish baselines for people who have no firearms association compared to those who do. Thus, to assess the significance of GSR evidence, it is essential to research the frequency of GSR in the background population and enhance the capabilities to distinguish between GSR-like particles and authentic GSR particles. Residue samples were collected from background populations who have not fired a gun in 24 hours and analyzed using a rapid LIBS method and SEM-EDS (100 high-risk and 350 low-risk sets). The low-risk background consists of individuals who had no contact with GSR or GSR-like compounds, while high-risk consists of individuals likely to have components that could be flagged as GSR particles (e.g., mechanics, police, agriculture workers). Being able to differentiate between GSR-like or true GSR particles is simpler for leaded ammunition since the combinations of lead, barium, and antimony were only observed on 1.8% of the background stubs. High-risk samples on the other hand are more challenging, particularly for lead-free ammunition, presenting up to two or three lead-free elements on 64% and 28% of the samples, respectively (e.g., Cu, Zn, Ti, S, Ba). This study reports various populations of interest, examines trends in elemental compositions, and uses machine learning algorithms to classify the populations.

**Funding:** Federal

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #71**

**Proposed Mechanism for Electrochemically-Controllable Synthetic Muscle Fibers**

**Miles Nelson\*, Derrick Banerjee, and Konstantinos Sierros, Ph.D.**

*Flexible Electronics and Sustainable Technologies Laboratory, Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV 26506*

**Broad category:** Engineering

**Presenter's major:** Mechanical Engineering

Damage or degeneration of skeletal muscle tissue is a widespread cause of mobility loss and disability from a source of multiple injuries or diseases. Methods to supplement or replace damaged muscle tissue with robotics has been in development since the 1960s. Here is proposed a mechanism for the construction of an array of artificial muscle fibers activated via microcontrollers to allow fine adjustment of strain. By utilizing cold-drawn laminated fibers of highly disparate thermal expansion coefficients, temperature changes in the fiber cause a coiling of the laminate resulting in uniaxial strain with a fine resolution of control. An alternative actuation method and arrangement of the fibers is proposed to allow the actuation of these fibers via electrical resistance from a current passing through the fibers, in contrast to the direct application of heat to initiate the strain response. This alternate method would allow a more finely controllable and quantifiable actuation of the fibers as well as the possibility of arranging multiple fibers in an array analogous to natural muscle tissue. Modification of the materials used for fiber extrusion would alter the filament's electrical conductivity and thus render it more receptive to changes in current. Further work includes the manufacture and testing of strain and other material properties of this proposed modified fiber as well as cycle durability.

**Funding:** State

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #72**

**Inhibition of Cell Signaling Regulator microRNA-21 Hinders Glioma Neurosphere  
Tumorigenic Capacity**

**Mackenzie Miller\* and Sonikpreet Aulakh, M.D.**

*Rockefeller Neuroscience Institute, West Virginia University, Morgantown, WV 26506*

**Broad category:** Health Sciences

**Presenter's major:** Biology

Glioblastoma multiforme (GBM) is the most highly aggressive and malignant brain tumor, which is in part due to GBM's highly invasiveness and quick progression. The aggressiveness of GBM is presumably due to cell signaling pathways that promote cell survival and tumor formation. MicroRNA-21 is a known gene regulator that is upregulated in the EGFR cell signaling pathway of GBM, and is involved in promoting cancer cell proliferation, invasion, and chemoresistance. The purpose of this study was to determine if inhibition of microRNA-21 in the glioma cell line LN229 would inhibit the formation and growth of in-vitro tumor neurospheres. A previously established cell culturing technique using neurosphere medium for the glioma cell line LN229 was used to induce in vitro tumor formation to study the effects of microRNA inhibition on tumor development and growth. Transfection of locked-nucleic acid microRNA-21 inhibitors are compared to mock transfected and locked-nucleic acid scrambled inhibitor transfected controls. Transfected cells cultured in neurosphere medium were monitored daily with pictures taken every 2-3 days to monitor neurosphere number and size and proliferation assays performed every 2-3 days as well. MicroRNA-21 inhibition showed significant decrease in neurosphere number and size compared to transfected controls. However, no significant difference was shown in the cell viability across conditions tested over the course of experiments. In conclusion, miR-21 inhibition did hinder tumor neurosphere 3-dimensional structure formation but not cellular replication.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** N/A

**Presentation #73**

**Stock Market Reactions to Deferred Tax Adjustments: The Effect of State Deferred Tax Deductions**

**Emma LaBombard\* and Lauren Cooper, Ph.D.**

*John Chambers College of Business & Economics, West Virginia University, Morgantown, WV 26506*

**Broad category:** Social Sciences

**Presenter's major:** Accounting & MIS

This study examines the stock market reaction to deferred tax adjustments resulting from state corporate tax reform. Firms are required to report their deferred tax accounts on their balance sheet when tax rates change. This revaluation must be reported on their income sheet, which can lower their reported net income. Corporations claim their stock prices are negatively affected by this required revaluation, but this is unclear based on prior literature. Firms have recently begun lobbying states to start enacting deferred tax deductions, which reduce a corporation's taxable income, to offset the negative income effect of the deferred tax adjustments stemming from changes in tax law. This study examines the quality of analyst forecasts surrounding firms' deferred tax adjustments. We find that financial analysts generally underreact to firms' quarterly deferred tax adjustments and that the state adoption of deferred tax deductions does not rectify this underreaction. Our findings provide evidence suggesting that deferred tax deductions do not have firms' desired effect of minimizing the negative stock market reaction to their reported deferred tax adjustments. These results will extend the deferred tax literature and inform whether other states and the federal government should consider enacting deferred tax deductions as a component of future tax reform.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #74**

**Increasing of Global Awareness: With an Emphasis on Russian and Eastern  
European Culture**

**Riana Bobes\* and Lisa Di Bartolomeo, Ph.D.**

*Department of World Languages, Literatures, and Linguistics, West Virginia University, Morgantown, WV  
26506*

**Broad category:** Humanities

**Presenter's major:** Biology, Russian Studies

In the state of West Virginia the majority of the population claims English as their first language, and less than three percent of the population claims to be foreign born. With such a distinct lack of diversity in the state, stereotypes are likely to form the basis of knowledge of other cultures for residents of West Virginia. Within the Honors EXCEL (Experimental and Community Engaged Learning) program, my project focused on increasing global awareness, with an emphasis on Russian and Eastern European culture, by interacting with West Virginia University students. This project used in-person and virtual events to bring free materials and activities to the campus. These events broached topics such as cuisine, music, prominent monuments and buildings, objects that are symbols of Russian culture. With this introduction to Russian and Eastern European cultures, students should be able to build the foundation of cultural awareness, humility, and competency outside the classroom. The skills learned through the passive and active programming are meant to inspire students to begin their own journey to learn about world language and culture. The project also taught valuable lessons on teaching world languages, and how teaching has to be adaptable not only to the constantly changing world, and the current global pandemic, but to the students' learning techniques as well.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #75**

**The Evolution and Origins of Appalachian Dance**

**Bethanny Prascik\* and Travis Stimeling, Ph.D.**

*School of Music, College of Creative Arts, West Virginia University, Morgantown, WV 26506*

**Broad category:** Creative Arts

**Presenter's major:** Anthropology and Dance

Appalachia is defined as a cultural region that encompasses 13 states and 420 counties. Despite myths of “Appalachian isolation” and “cultural purity,” the region has an extensively rich and diverse history, which the current project highlights and explains. The blending of the various cultural groups that have called Appalachia home over the years has created the distinct music, dance, and other cultural traditions that we know today. This research project shows the all encompassing nature of Appalachian dance traditions as it covers a variety of unique styles of dance and tracks their similarities, differences, and evolution over time. Drawing from the research of Phil Jamison (*Hoedowns, Reels, and Frolics*, 2015), I examined how Appalachian dance has changed and adapted as social dance traditions and popular culture has shifted over time. While research of the past was focused on preserving an Anglo-Saxon cultural identity and furthering nationalistic ideologies, the dance traditions which remain today showcase Appalachia as a melting pot of diversity. History has not always recognized the contributions of minority communities. However, this research project aims to not make those same mistakes. I strive to bring attention to all of the aspects that have shaped Appalachian dance traditions.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #76**

**The Need for the Care of the Self in Education**

**Aidan Connors\* and Scott Davidson Ph.D.**

*Department of Philosophy, West Virginia University, Morgantown, WV 26506*

**Broad category:** Humanities

**Presenter's major:** Philosophy

Michel Foucault is a prominent 20th century philosopher known for his works concerning questions of power and knowledge. Towards the end of his career Foucault became fascinated with the question of how the individual could create spaces of freedom within unfreedom. The recently published lecture course, *The Hermeneutics of the Subject*, sheds new light on this aspect of his work. Foucault returns to ancient Greek and hellenistic thought to tap into the resources of the care of the self. These practices of the care of the self mattered more for the ancients than knowledge of the exterior world. Through careful reading of these lectures, my research attempts to identify key features of the ancient techniques of the care of the self. These techniques include an exercise of thought in which the reader takes up what they learn from the text as their very own, the goal of reading being to formulate principles of behavior rather than learning what the author meant. Another involves the subject being completely honest in conversation with the guide or teacher, so as to get closer to the truth. This paper suggests that these techniques have a contemporary relevance because they are absent in today's educational institutions, which currently privilege knowledge about the external world. Techniques of the self would enable the student to create spaces of freedom within unfreedom.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #77**

**How Poetry Can Influence Certain Voices in Martin Luther King Jr.'s Speeches and Papers**

**Michael Duong\* and Timothy Sweet, Ph.D.**

*Department of English, West Virginia University, Morgantown, WV 26506*

**Broad category:** Humanities

**Presenter's major:** Creative Writing and Entrepreneurship

Martin Luther King Jr. is regarded as one of the most influential figures in the Civil Rights Movement mainly due to his success in delivering thought-provoking speeches. His speeches, which are inspirational calls to action, are grounded from an African American tradition of speech and oration. By using poems, notably by Willaim Cullen Bryant, James Rusell Lowell, and Langston Hughes, King could connect to the audience even more than he did with just his skills in the church. In doing so, he grounded the audience and enabled them to think critically about their future actions and how it would cause a ripple effect in history. However, it was not always this case as it can be examined how King changed his rhetoric later on in the Civil Rights movement to adhere to the overwhelming grievances most African Americans felt. As Miller suggests, it was the usage of direct and purposeful speech provided by Langston Hughes that kept his audience calm and collected in the moment, whereas the pieces from Bryant and Lowell kept them hopeful of future change. In my research proposal, I would undertake an analysis of Martin Luther King Jr.'s use of poems from Hughes, Lowell, and Bryant to enhance his own voice. By comparing usages and cases where MLK adopted these poems, I can then determine the impact of poetry on his audience; therefore enabling me to depict a certain pattern in his work and understanding why he used specific poems in different cases.

**Funding:** Not funded

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



**Presentation #78**

**Neighbor Against Neighbor: How Politics and War Paved the Way to Anti-Semitic Violence (1914-1941)**

**Elijah Kaznoski\* and Robert Blobaum, Ph.D.**

*Department of History, West Virginia University, Morgantown, WV 26506*

**Broad category:** Social Sciences

**Presenter's major:** History

Throughout the years following the First World War, Poland's Jewish population would be subject to an ever-growing animosity, ultimately culminating in violence. This animosity would manifest itself especially in war, such as World War I, the Polish-Soviet War, and early World War II. Not only would war bring about anti-Semitic raids from military forces, but it would also lead to the execution of pogroms against Jews by those they knew best—their neighbors—Poles, Ukrainians, and Lithuanians would all come to participate in acts of anti-Jewish violence. The purpose of this project is to construct a comprehensive model of anti-Jewish violence in Poland during the period of 1914-1941. Construction of this model requires detailed documentation of anti-Semitic violence and subsequent data analysis of this violence. This analysis will be performed by data mining and interpretation from sources including William Hagen's *Anti-Jewish Violence in Poland, 1914-1920* and the Virtual Shtetl database. Through data recording and analysis, this model will give insight into causes of anti-Semitic violence by answering important questions. Is violence cyclical? Where and why do these cycles exist? This project will isolate violent incidents singular and repeated; categorize them; and identify their patterns and characteristics. Thus far, data indicates heightened violence immediately before and after wartime as well as during periods of rising anti-Semitism, with increased civilian-executed pogroms in concert with and independent of anti-Semitic military action. The next stage of the project entails geographically mapping this data, utilizing demographic and electoral data, to make a conclusive model of this violence.

**Funding:** Other

**Program/mechanism supporting research/creative efforts:** WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

**Presentation #79**

**Autonomy and its Significance to a Good Life According to Spinoza and Kant**

**Jada Taylor\***

*Department of Philosophy, West Virginia University, Morgantown, WV 26506*

**Broad category:** Humanities

**Presenter's major:** Philosophy

Autonomy can be an ambiguous concept but clarifying its meaning is a worthwhile pursuit for our personal, social, and political well-being and progress. Both Spinoza and Kant expressed the urgency in defining this concept so that it may be used to counteract its contrasting concept, heteronomy. Heteronomy is when one is controlled by outside forces including superstitions, other people, or even our own emotions, insofar as our emotions cause us to act contrary to our reason. People can be influenced by these forces in ways that are interpreted as their own thoughts and desires. Their ability to live well and politically congregate towards social progress is put in danger by heteronomy. Autonomy gives people the control over their actions to limit the effects of heteronomy on people and societies. Spinoza and Kant both center rationality in their conceptions of autonomy. For Spinoza, autonomy is reached by the intuitive knowledge that all things are contingent on an immanent God or nature. Thus, knowing that all things and events follow from God frees oneself from relying on superstitions and other heteronomous forces. For Kant, autonomy is the ability to access the guidelines of morality, give moral laws, and follow them. While their concepts of autonomy are similar, they have complex disagreements when it comes to determinism and free will, the utility of desire, and the objectivity of morality that autonomy rests on. Regardless, they both position autonomy as a key concept to living a good life for ourselves and our communities.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #80**

**The Importance of Utilizing Social Media for Non-Profit Organizations**

**Keely Krueger\***

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**Broad category:** Other

**Presenter's major:** Multidisciplinary Studies

Social media occupies a significant role in our everyday lives. It is utilized by individuals connecting with friends and family, in addition to businesses, nonprofit organizations, government agencies, and more. Businesses and organizations may intertwine a campaign on social media for a particular purpose, whether that be to draw attention to current initiatives within the organization or to increase their following and expand awareness. Nonprofit organizations typically use social media to raise awareness of their cause and mission as well as raise donations and funding. For this Honors EXCEL project, I partnered with a nonprofit in Morgantown, WV to analyze their social media and initiate new content ideas with the intent to boost engagement and awareness. The nonprofit, Hearts of Gold, trains service dogs for veterans with mobility and psychiatric impairments. This presentation will summarize where Hearts of Gold began in terms of their social media at the beginning of this project to the results recently recorded. Analyzing the methods and results of this social media project for Hearts of Gold, other nonprofit organizations can get a sense of how they can improve their own social media efforts. This will also share how important utilizing social media can be for organizations.

**Funding:** Institutional

**Program/mechanism supporting research/creative efforts:** Honors EXCEL

**Presentation #81**

**Movement and Identity in Donato Ndongo's El Metro**

**Allison Berg\* and Sonia Zarco-Real, Ph.D.**

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**Broad category:** Humanities

**Presenter's major:** Spanish, English

In recent decades, Spain has experienced an increased influx of immigration from Africa. There is often a lapse in understanding of the immigrant experience, rendering immigrants, in a way, invisible. In response to this, intellectuals are creating literature about the lives of African people living in Spain. These cultural products do not engage politics, but conversations about (de)colonial context, providing an understanding of the immigration controversy from a non-western perspective, making immigrants “visible”. Often they criticize the white gaze as it relates to African immigration. One of the key elements in these works is the problematization of the ways that identity is constructed by the experience becoming an immigrant, challenging the conventional European tendency to dismiss their humanity. An example of this is Donato Ndongo’s *El Metro* (2007). The novel *El Metro* combines (non)western vernacular language as well as storytelling conventions which follows the life of its main character Lambert Obama Ondo, a Cameroonian man. The novel works against colonial themes through his very mosaic identity, doing this through the construction of movement in the text. In this presentation, I will analyze how Obama's identity is transformed through devices such as the van, the truck, the patera, the airplane, the car, and finally, the metro. I will also explain why the novel combines referential as well as symbolic elements that address the postcolonial world of the novel. In *El Metro*, movement reveals the fluidity of identity that many immigrants experience, furthering the decolonial conversation about African immigration to Spain.

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