



MID-ATLANTIC REGIONAL CONFERENCE
FOR UNDERGRADUATE SCHOLARSHIP

WARGUS

AT RANDOLPH COLLEGE



PRACTICE



FACT



SATURDAY, NOVEMBER 8, 2025

Welcome to the 27th Mid-Atlantic Regional Conference for Undergraduate Scholarship (MARCUS)

We at Randolph College are especially proud to be hosting you for the 27th anniversary of MARCUS! Whether you are a presenter, a faculty sponsor, or guest, we are pleased that you are here participating in our conference.

The **Mid-Atlantic Regional Conference for Undergraduate Scholarship (MARCUS)** was founded and hosted by Sweet Briar College from 1999-2018. Since its inception, MARCUS has attracted students from colleges throughout Virginia and surrounding states, who present their research in various formats, including oral presentations, poster presentations, and elevator speeches.

Our conference atmosphere is one of lively inquiry in which the student researchers are the experts, presenting to an audience of their peers. Unlike many conferences, MARCUS is purposely interdisciplinary, with an emphasis on the intersection of disciplines across the liberal arts spectrum. For instance, one presentation session may include students in history, economics, political science, and anthropology, all sharing a research interest in globalization. In another session, the common topic may be preserving species habitats and include presentations in biology, environmental studies, and philosophy.

Please help the student presenters hone their presentation skills by asking questions regarding their scholarship during the question and answer (Q&A) period following their talks and be sure to visit the poster presenters who are also eager to share their work.



You are welcome to explore the rest of our beautiful campus.

KEYNOTE SPEAKER

Linda Helmick (she, her, hers) earned her Ph.D. in Curriculum and Instruction, Art Education at Indiana University and currently works as an Associate Teaching Professor of Art Education at the University of Missouri in Columbia. She also holds an M.A. in Painting from the University of Indianapolis and a BFA in Painting from Herron School of Art and Design.

Helmick is a queer artist/researcher/teacher who grounds her work in the belief that creative expression is a basic human right that should be accessible for all. She promotes creativity as a powerful force for change, healing, and transformation.

Helmick's work resides at the intersection of critical theory, visual arts pedagogy, and positive psychology within educational and community spaces to impact ways students, fellow teachers, and communities deal with trauma, isolation, anxiety, and difficult issues such as bias, cultural stereotypes, and racial injustices.



schedule

SATURDAY, NOVEMBER 8, 2025

8:15 a.m. - 9:00 a.m.: Registration - *Main Hall Lobby*

Light breakfast & Coffee - *Quillian Conference Room*

9:00 a.m. - 10:05 a.m.: Welcome and Keynote Speaker - *Nichols Theatre*

WELCOME: DR. CRYSTAL D. HOWELL

ASSOCIATE PROFESSOR OF EDUCATION AND DIRECTOR OF THE CENTER FOR STUDENT RESEARCH, RANDOLPH COLLEGE

KEYNOTE SPEAKER: LINDA HELMICK, PHD

ASSOCIATE TEACHING PROFESSOR OF ART EDUCATION AT THE UNIVERSITY OF MISSOURI IN COLUMBIA

“A Look at Art, Love, and Survival Through the Lens of Arts-Based Research”

10:15 a.m.-11:15 a.m.: Poster Session I, *Hampson Commons*

11:30 a.m.-12:30 p.m.: Oral Presentations Session I

Nichols Theatre, Klein Boardroom, Psychology 101

12:30 p.m.-1:30 p.m.: Lunch Buffet- *Smith Banquet Hall, Smith Building*

1:45 p.m.-3:00 p.m.: Oral Presentations Session II, *Nichols Theatre, Klein Boardroom, Psychology 101*

3:00 p.m.-4:00 p.m.: Poster Session II, *Hampson Commons*



oral presentations

SESSION 1 11:30 a.m. - 12:30 p.m.

Session 1a

Nichols Theatre, Student Center

Moderator: M. Stang, Ph.D.

11:30 a.m. Mohima Anushi '26, Sweet Briar College

Examination of a Silicon Strip Detector in Support of Proposed Deuteron Charge Radius Measurements
Advisor: Dr. Forrest Frisen

11:45 a.m. Matieya Johnson '26, Virginia Tech

Soil Microbial Community Composition Drives Variation in Collembola Effects on Beet Nutrient Content
Advisor: Dr. Ashley Jernigan

12:00 p.m. Rue Pomeroy '27, Sweet Briar College

Hegemony or Oligarchy: Global Order in the Modern World
Advisor: Dr. Jeffrey E. Key

12:15 p.m. Lorelei Teeter '26, Sweet Briar College

A Bayesian Approach to Earthquake Forecasting Along Subduction Zones
Advisor: Dr. Stephen Loftus

Session 1b

Klein Boardroom

Moderator: Jonathan Skelton, Ph.D.

11:30 a.m. Grant Baker '27, University of Virginia

Towards Characterizing the Biophysical Landscape of Immune Cell Plasma Membranes with a Novel Modular Toolbox
Advisor: Dr. Ilya Levental

11:45 a.m. Hannah Peterson '27, Jack Parmley '26,

Layla Viera '26, Isak Schwillie '28, Virginia Tech
Sustainable Aviation Fuel's Effect on Fluorocarbon Viton O-rings
Advisors: Dr. Todd Lowe, Dr. David Gray

12:00 p.m. Ciara Naufal '26, Sweet Briar College

Modeling the Academic Outcomes Associated with the Sweet Briar College Grants for Engaged Learning
Advisor: Dr. Stephen Loftus

12:15 p.m. Kendall Rander '26, Sweet Briar College

You Are What You Eat: Maize, Cannibalism, and Communion in the 16th Century Guatemalan Highlands
Advisors: Dr. Lynn Laufenberg, Dr. Tracy Hamilton

Session 1c

Psychology Room 101

Moderator: Siavash Sattar, Ph.D.

11:30 a.m. Cece Constantino '26, Sweet Briar College

Spiritual Warfare Ideology and American Political Beliefs
Advisors: Dr. Lynn Laufenberg, Dr. Campbell

11:45 a.m. Sidney Ford '27, Sophie Labib YEAR, Virginia Tech

Comparative Analysis of Nerve Conduction Velocity and Threshold in Asian Jumping Worms and Canadian Nightcrawlers
Advisors: Dr. Ashley Jernigan, Dr. Zhuo Fu

12:00 p.m. Gabby Hammond '26, Sweet Briar College

Shifting the Tide: Aboriginal Women Artists and their Impact on the Art World
Advisor: Dr. Tracy Hamilton

12:15 p.m. Connor Jones '26, Virginia Military Institute

Metagenomic Analysis of Microbiome Supporting Tardigrade Cryobiosis
Advisor: Emily Fadia

12:22 p.m. Ryan Abernathy '27, Longwood University

High Influence: From Puff to Peer Pressure
Advisor: Dr. Heather Kissel

SESSION 2 1:45 p.m. - 3:00 p.m.

Session 2a

Nichols Theatre, Student Center

Moderator: August Hardy, Ph.D.

1:45 p.m. Indu Sharma '27, Sweet Briar College

Assessing NDB Project Performance: A Comparative Analysis
Advisor: August Hardy, Randolph College

2:00 p.m. Chloe Burchett '26, Sweet Briar College

The Eunuch and the Empress: Jewelry and Gender in the Byzantine World
Advisors: Dr. Erin Pitt, Dr. Tracy Hamilton

2:15 p.m. Christian O'Neill '26, Longwood University

Ukrainization in the Face of Russification: Nestor Makhno and Anarchism
Advisor: Dr. Yulia Uryadova

2:30 p.m. Hayne Webster '27, Westminster College

Albert Speer: Defense at Nuremberg and What it Means for Humanity in the Future
Advisor: Dr. Russell Martin

Session 2b

Klein Boardroom

Moderator: Pin-Chen Lin, Ph.D.

1:45 p.m. Atty Bestwick '28, Sweet Briar College

The Decolonization of South American History in Relation to the Development of Pre-Empire Peru
Advisor: Dr. Erin Pitt

2:00 p.m. Hunter Cleland '26, Hampden-Sydney College

The Continuity of Christ: Tracing an Early Subordinationist Christology from its Jewish Roots
Advisor: Dr. Michael Utzinger

2:15 p.m. Alice Duncan '26, Sweet Briar College

The Relationship Between Heterosexual Sexual Scripts and Attitudes Toward Asexuals
Advisor: Dr. Tracy Hipp

2:30 p.m. Leah Partington '26, Sweet Briar College

Bound by Words: A Journal of Strangers; Revitalizing Sweet Briar College's Movable Type Collection

Advisors: Dr. Laura Pharis, Dr. Shawn O'Connor

2:45 p.m. Addison Compton '27, LezLye Mason '28, Randolph College

Small Project, Large Impact: a Case Study of Localized Tick Collection across an Urbanized Landscape in Lynchburg, Virginia
Advisor: Erin Heller

Session 2c

Psychology Room 101

Moderator: Peter Sheldon, Ph.D.

1:45 p.m. Kemka Ihemelandu '27, Georgetown University

ApoptiScope: A Computational Imaging Tool for Quantifying NK Cell-Induced Apoptosis in 3D Pancreatic Cancer Models
Advisor: Dr. Marwa Afifi

2:00 p.m. Ashlynn Bennett '27, Virginia Tech

What Makes You Worry: Examining Parent and Child Predictors of Youth Anxiety Symptoms
Advisor: Dr. Rosanna Breaux

2:15 p.m. Morgan Sikes '28, Jacey Wright '28, Randolph College

Impact of Element Layout on the Mechanical Behavior of FFF-Processed Glass Fiber Composites Structures

Advisors: Dr. Siavash Sattar, Dr. Peter Sheldon

2:30 p.m. Mohima Anushi '26, Sweet Briar College

Examination of a Silicon Strip Detector in Support of Proposed Deuteron Charge Radius Measurements
Advisor: Dr. Forrest Frisen

2:37 p.m. Alyssa Morrison '28, Claudia Ramos Lopez '28, Austin Mason '27,

Claire Cho '28, Sam Castellani '25, Junting Zhou '27, Virginia Tech
Chronic Effects of Trimethylamine N-Oxide on Mouse Hearts
Advisor: Dr. Jia-Qiang He

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abstracts

Poster Session I

10:15 a.m. - 11:15 a.m. Location: Hampson Commons

1. Ayesha Mahmood '26, New York University

Deficient SYNJ2 RNA Binding leads to Neuronal Vulnerability and Cell Death, Advisor: Dr. Whitney Gibbs

Synaptojanin 2 (SYNJ2), classically known as a phosphoinositide phosphatase, also functions as an RNA binding protein that plays a role in mitochondrial health. Our lab has demonstrated that mutations in RNA recognition motif (RRM) disrupt neuronal homeostasis and mitochondrial function in the distal part of the neuron, leading to increased neuronal cell death when exposed to mitochondrial toxins. These RRM mutant neurons exhibit reduced SYNJ2 protein, suggesting that both the loss of protein and impaired RNA binding contribute to neuronal vulnerability. To investigate the mechanisms underlying this enhanced cell death, we induced mitochondrial stress using CCCP, a mitochondrial uncoupler that disrupts membrane potential, in wild type and SYNJ2 RRM mutant neurons. We then monitored mitochondrial function through Seahorse respirometry and evaluated apoptotic and ER stress responses by detecting key makers (caspase-3/9, CHOP, ATF6, PERK, XBP1) via western blotting. Cytochrome c localization was assessed via immunocytochemistry to further evaluate apoptotic signaling. This study demonstrates how impaired SYNJ2 function increases neuronal susceptibility to mitochondrial stress, culminating in cell death.

2. Mohima Anushi '26, Sweet Briar College

Examination of a Silicon Strip Detector in Support of Proposed Deuteron Charge Radius Measurements, Advisor: Dr. Forrest Frisen

The 6 discrepancy between the smaller deuteron radius measured by muonic deuterium spectroscopy and the larger value from electron scattering and spectroscopy experiments is known as the “deuteron charge radius puzzle” which is similar to the well-known “proton charge radius puzzle.” We made measurements to support the design of a recoil detector to be placed inside the target cell of the proposed DRad experiment at Jefferson National Lab to enable precise detection of low-energy recoil deuterons, ensuring the elasticity of the electron-deuteron (e-d) scattering process. A large-area silicon strip detector (SSD) was tested with alpha particles from a ^{241}Am source from room to cryogenic temperature in a vacuum chamber on the 59^o beamline at the Triangle University Nuclear Lab (TUNL) Tandem Accelerator, using a custom-designed and fabricated aluminum plate to mount the detector to the cold head. The SSD had 756 AC-coupled strips combined into 16 channels, instrumented with a Mesytec MMR pre-amplifier to record the alpha spectra, for evaluating energy resolution. The detector’s energy resolution improved with decreasing temperature.

3. Grant Baker '27, University of Virginia

Toward Characterizing the Biophysical Landscape of Immune Cell Plasma Membranes with a Novel Modular Toolbox, Advisor: Dr. Ilya Levental

Cellular membranes comprise hundreds of unique lipid species whose interactions result in a variety of membrane properties such as lipid packing, membrane thickness, and membrane fluidity. These biophysical properties, in combination with preferential sorting of lipids, regulate membrane-associated proteins which represent approximately 60% of drug targets and are encoded by more than 30% of the human proteome. Investigating the influence of local lipid environments—functionally termed the paralipidome—may provide revolutionary insight into fundamental biological mechanisms. For example, the Linker for Activation of T-Cells (LAT), a critical regulator of immune cell activation, is thought to be strongly modulated by its lipid environment. We present a modular HaloTag-based toolbox that integrates environment-sensitive fluorescent probes, previously applied to measure bulk membrane properties, to directly measure the biophysical properties of the paralipidome near specific proteins. We report successful implementation and validation of this approach and highlight ongoing progress in applying the toolbox to characterize the local lipid environment of T-cells before and after immune cell activation.

4. Phillip Sherrill '26, Sarah League '26, Christopher Newport University

Effects of Nicotine and Alcohol on Hippocampal Spine Density in a Rodent Model of Adolescence, Advisor: Dr. Gina Fernandez

Previous research demonstrates that early nicotine and alcohol exposure can have detrimental effects on brain development. We used a rodent model of adolescent drug exposure to examine hippocampal spine density (HSD). The hippocampus is critical in learning and memory and is still developing during adolescence. As such, we examined whether adolescent drug exposure to alcohol, nicotine, or their co-administration affected the number of spines along dendritic branches, a proxy for synaptic communication. Male and female Sprague Dawley rats were exposed to either 0.4 mg/kg nicotine (equivalent to one JUUL pod dose), 20% alcohol (equivalent to binge drinking), or both drugs starting at 28 days of age. Animals exposed to water and saline served as controls. All animals received 12 exposures on an intermittent schedule, and neural tissue was harvested in mid- adulthood after a drug free period. We did not find any effect of either sex or drug exposure on HSD. Similarly, we did not find any interactions between our sex by drug exposure conditions. These findings indicate that our adolescent drug exposure model did not significantly affect cortical structures. However, there was a trend toward higher HSD in animals exposed to any drug compared to controls.

5. Jason Farnsworth '26, Randolph College

3D Room Generation from 2D Semantic Layout, Advisor: Dr. Rui Yu, University of Louisville

We propose a cascaded 3D diffusion pipeline for generating 3D indoor scenes using Truncated Signed Distance Functions (TSDFs) with 2D semantic layout as input. The pipeline is designed to run in a sparse occupancy space and in a coarse to fine fashion. The DiffInDScape [5] diffusion model is used as a base due to its ability to generate 3D indoor scenes using 2D sketches. Our proposed method would show an improvement in generating furniture within indoor scenes with the information provided by 2D semantic layouts.

6. Kameron Williams '26, Christopher Newport University

Are Verbal Utterances a Result of Searches in FTF Interactions? Advisor: Dr. Jeffrey Gibbons

When searching for information, it has been observed that many individuals make sounds, such as “tsch, tsch, tsch.” Research demonstrated that sounds, such as tsch, tsch, tsch are filler sounds, which are meaningless speech components that do not add to speech (Arrasul et al., 2024). When an individual is placed in a setting or completing a task that produces nervousness, the likelihood of producing a filler sound is enhanced (Afriyanti et al., 2020). To test the reliability of filler sounds in search tasks, we asked students to search for difficult-to-find numbers arranged randomly on a single page in the presence of a researcher. We expected filler sounds not to be consistent in nature among some participants. We expected some participants who produce filler sounds to be aware and other participants to be unaware of their utterances. We also expected aware filler utterers to report the strongest negative emotions, the lowest FAB, the lowest recall, as well as recall the fewest target words and most false words in a DRM, followed by unaware filler utterers, and then non-filler utterers.

7. Simi Chakravarty '27, University of Virginia

Excess Dopamine Impairs Serotonin Reuptake In Fumin Drosophila melanogaster Larvae, Advisor: Dr. Jay Hirsh

This project investigates serotonin (5HT) localization and regulation in response to excess dopamine in the larval central nervous system (CNS) of *Drosophila melanogaster*, focusing on fumin (fmn) mutants compared to the wild-type (w1118). Fmn flies display abnormally high activity, reduced periods of rest, and sensitive arousal due to a genetic lesion of their dDAT (dopamine transporter) gene. The dDAT gene is responsible for the reuptake of dopamine in the synapses between fly neurons. A genetic lesion from a random 2kb insertion disrupts the dDAT gene and results in an excess of dopamine in the fmn flies' synapses. Preliminary data show that fmn exhibits a near-complete loss of intracellular 5HT immunoreactivity in the larval nerve cord, despite maintaining total 5HT levels by HPLC. These findings suggest that excess dopamine present in the fmn genotype disrupts intracellular 5HT, potentially through altered reuptake mechanisms. Supporting this idea, fmn larval CNS showcase decreased uptake of 5HT in 5HT incubation compared to wild-type, despite HPLC confirming the presence of serotonin. In addition, application of escitalopram, a serotonin specific receptor inhibitor (SSRI) commonly utilized as an antidepressant, to wildtype larvae yields a similar phenotype to Fmn. This research addresses a critical gap in monoaminergic system interaction. Although dopamine and serotonin are often studied independently, their balance is central to the regulation of arousal, mood, and sleep. Dysregulation of these systems is implicated in human disorders such as ADHD, depression, and Parkinson's disease. These findings may inform future approaches to therapeutic intervention.

8. Annie Gilbert '26, Randolph College

Bringing Iceland to the Classroom, Advisor: Dr. Crystal Howell

This independent study explores the unique geologic and environmental systems of Iceland through an interdisciplinary lens combining earth science, geography, and education. Centered on Iceland's position along the Mid-Atlantic Ridge, the project investigates how volcanic activity, geothermal energy, and glacial processes shape both the physical landscape and the daily lives of its people. Fieldwork included observing geothermal sites, volcanic formations, and glacial valleys to examine how Earth's internal energy drives surface change. The study connects these phenomena to classroom applications, emphasizing inquiry-based science instruction that helps students understand real-world examples of energy transfer and land formation. Building on this research, I designed two differentiated science mini-units, one for lower elementary and one for upper elementary students, aligned with Virginia SOL standards. The project demonstrates how experiential research can translate into engaging, standards-based instruction that inspires curiosity about Earth systems. Overall, this study highlights Iceland as a living laboratory for teaching how natural forces continuously shape our planet and provides a framework for bringing authentic, global science experiences into elementary classrooms.

9. Caden Mills '27, Christopher Newport University

The Impact Marijuana Has on Memory and the Fading Affect Bias: A Diary Study, Advisor: Dr. Jeffrey Gibbons

The fading affect bias (FAB) demonstrates the tendency for negative emotions to diminish faster than positive emotions (Walker et al., 1997; Walker et al., 2003). The FAB is considered a coping response (Gibbons et al., 2024; Walker et al., 2003) as it is negatively related to non-adaptive outcomes and positively related to adaptive outcomes (Gibbons et al., 2023). Notably, Pillersdorf and Scoboria (2019) found that marijuana consumers displayed lower FAB than non-marijuana consumers for non-marijuana related events, and Fernandez et al. (2021) found that non-marijuana consumers displayed lower FAB than marijuana consumers for marijuana related events. The current diary study was conducted to replicate the method and findings of the Fernandez et al. study. Additionally, based on the social media diary study by Gibbons et al. (2022) showing that false memories from a diary procedure negatively predicted FAB, we expected false memories for marijuana and non-marijuana events would negatively predict the FAB. We also expected that these complex results would be mediated by rehearsal ratings. The results supported the hypotheses and additionally showed that accurate memory positively predicted the FAB. Interestingly, marijuana consumption amplified the unexpected positive relation between falsely reported non-marijuana memories and the FAB.

10. Johnny Armstead '29, Josiah Mou '26, Christopher Newport University

Sources Affect Believability and Recognition of Truthful and Rumorous Headlines, Advisor: Dr. Jeffrey Gibbons

Past research has found that unbelievable (rumorous) headlines became more believable across time and were recognized with greater accuracy than believable (truthful) headlines (Gibbons et al., 2005). The current study examined how media priming (media exposure prior to learning) affects headline believability and recognition with media sources expected to influence headlines believability and recognition. Participants read one of three priming conditions: New York Times, Twitter feed, or math problems. Afterwards, participants rated the believability of 24 headlines (12 believable, 12 unbelievable headlines). Participants rated the headlines from -3 (very unbelievable) to +3 (very believable). After 48 hours, participants rated the believability and attempted to recognize 48 headlines, 24 target headlines (old) and 24 foils (new). The results showed that rumored headlines were less believable and more recognizable than truths, and believability decreased more for truthful headlines than rumored headlines. In addition, sourcing at time 1 and time 2 increased believability for truthful headlines, but not for rumored headlines. Furthermore, rumored headlines were recognized more accurately than truthful headlines, and non-sourced time 1 headlines were recognized more accurately than sourced time 1 headlines. In summary, the results supported the main hypotheses. The study is still ongoing and actively collecting more data.

11. Kyle Thompson '28, Andrew Hooks '27, Randolph College

3D Printing a Bimetallic Stainless-Steel, Advisor: Dr. Jonathan Skelton

Bimetallic structures offer the potential to combine properties of different materials within a single component, enabling unique performance for specific applications. This research explores the fabrication and mechanical properties of bimetallic samples composed of stainless-steel alloys 316L and 17-4PH using Metal Fused Filament Fabrication (MFFF). Samples were printed with varying material ratios and scan strategies to investigate how these parameters influence the overall mechanical properties. After printing and sintering, specimens underwent tensile and hardness testing. Results revealed a clear relationship between the 316L and 17-4PH ratio, the chosen print pattern, and the resulting mechanical behavior. These findings highlight the potential of low-cost FDM-based metal printing to produce customized composite components and provide a foundation for future research of optimizing gradient structures and interface bonding in additively manufactured metals.

12. Brenna McMannus '26, Charlotte O'Connors '28, Christopher Newport University

There Can Only Be One: FAB and Sexual Events, Advisor: Dr. Jeffrey Gibbons

The fading affect bias (FAB) occurs when emotions tied to autobiographical memories fade more quickly for unpleasant than pleasant events. The FAB is a healthy coping mechanism that helps people move past aversive experiences and seek pleasant ones. Past research showed that relationships contributed to participants' psychological well-being and dyadic functioning (Caron et al., 2012). Although past FAB research has examined the FAB for romantic/non-romantic relationship events (Zengel et al., 2019), relationship/non-relationship events (Gibbons et al., 2021), and sexual/non-sexual experiences (Crawford et al., 2021), it failed to compare sexual events to non-sexual, non-romantic relationship events. The current study filled this gap in the literature showing a higher FAB for non-sexual, non-romantic events than sexual events as expected, and the expected relations between adaptive and non-adaptive non-sexual and sexual variables and the FAB. Complex interactions demonstrated the complexity of romantic relationships and emotion regulation. For example, positive emotions faded faster than negative emotions at low levels of partner-esteem and mother attachment, but the FAB increased along with mother attachment. The FAB was also small at high levels of both partner-esteem and mother attachment, suggesting that participants emotionally regulated well with one influential person in their lives, not two.

13. Trinity Boucher '28, Bridget Little '27, Christopher Newport University

Interaction Between the Fading Affect Bias and the 2024 Presidential Election, Advisor: Dr. Jeffrey Gibbons

Fading affect bias (FAB; Walker et al., 2003a) suggests that negative emotions fade faster than positive emotions. In the context of the 2020 presidential election, Gibbons et al. (2024) discovered a smaller FAB for political events than non-political events, with the effect being larger for conservatives than liberals. The current study expanded the study to the 2024 presidential election and added a recall procedure. Participants recalled and provided initial and current affect and rehearsal ratings for pleasant and unpleasant political and non-political events. After 1 week, participants recalled the events and made additional affect and rehearsal ratings. As expected, the FAB was smaller for political events than non-political events. The FAB was small but significant for liberals rating non-political events; it was reversed and significant (prominent positive fading) for conservatives rating non-political events. Conversely, the FAB was small but significant for conservatives rating political events and reversed and significant for liberals rating political events. These complex findings suggest that liberals emotionally regulated sufficiently for non-political events and poorly for political events, whereas conservatives emotionally regulated poorly for non-political events and well for political events. Both poor sleep and political media consumption negatively predicted the FAB, but the effects merely approached significance.

14. Olivia Close '27, Washington and Lee University

Blaming the Bot: Reduced Confrontation of Sexism When Attributed to ChatGPT, Advisor: Dr. Julie Woodzicka

The current study aims to explore the likelihood of confrontation in response to a sexist comment depending on whether the comment is claimed to have come from ChatGPT. To investigate this relationship, participants read a scenario in which a man shared a sexist comment about women's mathematical abilities and either said it on his own accord or that he received his information from ChatGPT. Participants were then asked to share how they would respond to the sexist comment. To analyze the results, open-ended responses were coded according to the type of response. Supporting past research, most participants (75%) believed they would confront the speaker. Additionally, participants who believed that the comment was inspired by ChatGPT were significantly less likely to say that they would report the sexist comment to HR compared to participants who believed that the man came up with the comment on his own. Similarly, there was a marginal effect where participants in the ChatGPT condition were more likely to accept the sexist comment as true compared to participants in the Self condition. The results suggest that people may not report someone exhibiting sexism if they believe that AI influenced the person's comment.

15. Ella White '25, Jenna Williams '26, Christopher Newport University

Nicotine Consumption and the FAB in Autobiographical Events, Advisor: Dr. Jeffrey Gibbons

The fading affect bias (FAB; Walker et al., 2003) is the faster fading of unpleasant emotions than pleasant emotions (Walker et al., 1997). The FAB is a healthy coping mechanism that is positively related to adaptive variables and negatively related to non-adaptive behaviors (Gibbons & Lee, 2019). Previous studies have demonstrated that chronic nicotine use is associated with non-adaptive psychological outcomes (Goriunova & Mansvelder, 2012; Parrott, 1998). The current study predicted that the FAB would be smaller for nicotine events than non-nicotine events and nicotine consumption would negatively predict the FAB. Nineteen participants (37% nicotine users) received a briefing and provided informed consent and then they completed demographic, personality, and nicotine questionnaires. Participants then described 8 different pleasant/unpleasant nicotine/non-nicotine events (two of each event) and rated their initial/current affect and rehearsal frequency for each event. After 4 days, participants recalled their events and re-rated their affect and rehearsal frequencies for each event. After completion, participants were thanked and debriefed. The FAB was positively predicted by nicotine use, positive PANAS, and anxiety and it was negatively predicted by poor sleep. We are currently still collecting data with an expected final sample of 160 participants.

16. Brietta Dalzell '28, Jaden Moore '27, Christopher Newport University

The Effect of the Fading Affect Bias in Relation to Compliant and Non-Compliant Behaviors, Advisor: Dr. Jeffrey Gibbons

The fading affect bias (FAB) is an autobiographical memory phenomenon that refers to the tendency of negative emotions to fade faster than positive emotions (Walker et al., 1997; Walker et al., 2003). Whereas the FAB has been examined across a wide variety of event types, it has not been investigated in relation to rule-following and rule-breaking behaviors. Participants recounted eight event types: two pleasant and two unpleasant events for each of the rule-following and rule-breaking categories with their initial event affect being defined at the time of the event (initially defined) or at the time of the survey (currently defined). The results showed a significant FAB effect for initially defined events, but not for currently defined events, and the FAB was negatively predicted by non-adaptive measures (i.e., depression and stress), which supported the hypotheses. A significant three-way interaction between initial event affect, event type, and rule orientation showed that scores on the rule orientation scale positively predicted the FAB for rule-following events, but they negatively predicted the FAB for rule-breaking events. Another three-way interaction between initial event affect, event type, and the Prosocial and Antisocial Rule Breaking Scale approached but did not reach significance, leading to further data collection and investigation.

17. Morgan Sikes '28, Jacey Wright '28, Randolph College

Flexural Behavior of 3D-Printed Hybrid Sandwich Structures with Varying Core Geometry and Fiber-Reinforced Face Sheets, Advisors: Dr. Siavash Sattar, Dr. Peter Sheldon

Composite sandwich structures (CSS) are valued for their high strength-to-weight ratio, particularly in demanding applications such as aerospace and automotive engineering. This study examines the flexural behavior of 3D-printed CSS fabricated using glass fiber-reinforced nylon (GF-PA6) cores, with and without carbon fiber (CF) face sheets. Two infill geometries—triangular and tri-hexagonal—were printed at 20% and 40% densities using fused filament fabrication (FFF). Hybrid composite sandwich structures (HCSS) were produced by bonding CF face sheets to the printed cores via epoxy resin and vacuum bagging. All specimens underwent three-point bending tests, as per ASTM C393, to evaluate flexural strength, stiffness, and failure mechanisms. Results show that both core geometry and face sheet type have a significant impact on mechanical performance. The HCSS with tri-hexagonal infill at 40% density achieved a modulus of 3.5 GPa and a strength of 110 MPa, outperforming all other configurations. In contrast, fully 3D-printed CSS with triangular infill at 20% showed the lowest performance (1.3 GPa, 30 MPa). Hybrid specimens exhibited more progressive failure behavior, whereas fully printed samples failed in a brittle manner. The findings demonstrate the effectiveness of combining optimized core design with high-performance face sheets to enhance the flexural properties of additively manufactured sandwich composites for lightweight structural applications.

18. Carly Estrella '26, Christopher Newport University

The Effect of Expertise on Divergent Thinking and Self-Plagiarism, Advisor: Dr. Gale Dow

With the modern luxury of exponential access to information, it is crucial to understand the factors that contribute to plagiarism and to develop strategies that prevent it while promoting expertise and creativity. The present study examined the effects of expertise and group dynamics on inadvertent plagiarism. It was hypothesized that experts would receive lower plagiarism scores than novices. Participants included 81 volunteers from a liberal arts university: 47 students enrolled in General Physics 201 (novices) and 34 in Design of Experiments Physics 341 (experts). Each participant completed a visual divergent thinking (DT) task adapted from Jansson and Smith's (1991) creative generative task. They were asked to design either a measuring cup for a visually impaired person or a spill-proof coffee cup. Plagiarism scores were assigned based on the degree to which participants copied provided examples or their own previous designs. Results revealed a significant negative correlation between expertise and plagiarism ($p = 0.002$), indicating that experts were significantly less likely to plagiarize and demonstrated greater creativity. These findings suggest that expertise not only enhances creative problem solving but also serves as a protective factor against inadvertent plagiarism in design-based tasks.

19. Mark Vorster '27, Peter Lane '27, Hagen Moran '27, Gracie Smith '27, Devyn Matheson, '28, Christopher Newport University

Pro-Social Behavior is Predicted by the Side-Effect-Effect, Advisor: Dr. Jeffrey Niehaus

The Side-Effect-Effect refers to whether people tend to see incidental consequences as intentional or not, depending on whether they are harmful or not. Harmful side-effects are seen as intentional, while beneficial side-effects are not. We wondered why this would be. Our conjecture was that a beneficial side-effect isn't informative of how much someone cares about the welfare of others compared to themselves (the "Welfare Tradeoff Ratio"). However, the willingness to engage in a harmful side-effect is informative. In our study, we found that participants rated people who created a beneficial side-effect to be significantly more likely to be more generous in the future than those who created a harmful side-effect.

20. Olivia Walker '27, Marcelo Viteri '27 Christopher Newport University

Workplace Drama: How Employee Observations of Reward Designation in Deserved and Undeserved Work Environments Influence Procedural Justice, Advisor: Dr. Jeffrey Gibbons

Procedural justice has been defined as the perceived fairness of the methods that determine the allocation of employee compensation or reward (Cropanzano et al., 2007). Past research has found that employees' levels of job satisfaction, organizational commitment, and trust in supervisors are related to their perceptions of fairness (Brockner et al., 2007; Feys et al., 2008; Forrest, 2002; Moorman et al., 1993). The current study investigated third-party observers' perceptions of fairness in a scenario where an employee was rewarded and deservedness changed across time. Participants read scenarios pertaining to an employee being rewarded and completed a variety of demographic, scenario comprehension, perceived fairness, responsibility, organizational commitment, and recommended consequences questionnaires. Participants portrayed the role of third-party employees who witnessed a supervisor rewarding a subordinate for an outstanding marketing idea. Scenarios stated that the rewarded employee came up with or stole the excellent marketing idea, and then participants made ratings related to fairness. Subsequently, employee responsibility changed, and participants made updated ratings related to fairness. We expected and found that our results supported past research from supervisor-subordinate punishment scenarios, which produced opposite and extreme fairness ratings at time 2 after employee responsibility changed compared to time 1 (contrasting-away effect).

21. Ross Roberts '26, Hampden-Sydney College

Utilizing Image Analysis and Computational Methods to Further Elementary Particle Physics Education, Advisor: Dr. Hugh Thurman III

Many prospective students in particle physics are dissuaded from learning elementary theory due to the relatively high mathematical understanding required and lack of accessible and comprehensive models. Bubble chambers are a historical method of visualizing particle decay. By using a combination of image analysis software and an octave code, new students can interact with and learn about the elementary particle decays without experience in a readily accessible way.

22. Bowen Charlebois '26, Hampden-Sydney College

Genetic Sampling for the Conservation of *Oncorhynchus clarkii lewisii*, Advisor: Dr. Mike Duncan

Oncorhynchus clarkii lewisii, or the Westslope Cutthroat Trout (WCT), is an at-risk species of fish residing primarily in the Mid and Pacific Northwestern United States. Many conservationist organizations, such as the U.S. Forest Service, the U.S. Bureau of Land Management, and the Montana chapter of the American Fisheries Society, along with the State of Montana, have each outlined WCT as an at-risk species, and this designation comes with certain allowances and protections to the species (FWP 2022). The specific project at hand was to find and record existing populations in waterways where they had been found previously or in places that had not yet been searched. Given that WCT can breed with invasive species such as Rainbow Trout, it was also necessary to perform genetic testing for the purpose of determining individual genetic purity so that future relocation efforts would not spread invasive traits. Whether or not relocation was a possibility for a population in a select fishery was also assessed during this tracking process, as environmental factors such as accessibility and population size can affect the decision-making when looking at the value of a relocation effort.

23. Kaden Sawyer '27, Hampden-Sydney

PCC Microstructural Damage and Network Dysconnectivity Associated with Postoperative Delirium, Advisor: Dr. Tyler Reekes, Duke University School of Medicine, Department of Anesthesiology: CIPHER Lab

Postoperative delirium (POD) is the most common post-surgical complication in elderly patients (≥ 65), characterized by acute inattention, altered consciousness, and cognitive disruption. POD has been associated with long-term cognitive decline and an increased likelihood of developing Alzheimer's disease and related dementias (ADRD). Despite its high prevalence, the underlying neurobiological mechanisms remain poorly understood. This study investigated whether preoperative microstructural damage within the posterior cingulate cortex (PCC), a key region of the Default Mode Network (DMN), is associated with altered functional connectivity and increased vulnerability to POD. Resting-state fMRI longitudinal data from 111 surgical patients (12 POD, 99 non-POD) were analyzed using the CONN toolbox to assess seed-to-voxel connectivity from PCC regions identified in prior DWI/NODDI analyses. Results revealed that preoperative PCC microstructural damage was associated with decreased intra-network connectivity between the PCC and medial prefrontal cortex (mPFC) and disrupted inter-network dynamics with the inferior frontal gyrus. These findings suggest that PCC dysconnectivity may underlie cognitive vulnerability and contribute to the onset of postoperative delirium.

24. Benjamin Gerber '27, Hampden-Sydney College

Increased Comorbidity Burden in patients with hEDS or HSD and Autism, Advisor: Dr. Michael Wolyniak

Hypermobile Ehlers-Danlos syndrome (hEDS) and hypermobility spectrum disorders (HSD) are rare genetic connective tissue conditions. Previous research has identified a positive correlation between these disorders and autism. This study aimed to further explore symptoms and comorbidities in individuals who self-reported autism and were diagnosed with hEDS or HSD, using a larger dataset than prior studies. Demographic and clinical information were retrospectively obtained from responses to a 350+ item REDCap intake questionnaire. Associations between hEDS or HSD and autism were analyzed using a two-sided Fisher's exact test to calculate p-values. Findings from this analysis provide additional insight into the overlap between connective tissue disorders and neurodevelopment conditions.

25. Colin Mason '28, Hampden-Sydney College

A Study of Phenoxyl Radicals of Curcumin and Related Molecules by Electron Spin Resonance Spectroscopy, Advisor: Dr. Herbert J. Sipe, Jr.

Electron Spin Resonance (ESR) spectroscopy revealed the presence of phenoxyl radicals from curcumin and related molecules, including 4-tert-butylphenol, 4-vinylphenol, 4-hydroxybenzalacetone, ferulic acid, bisdemethoxycurcumin. These molecules all share the presence of phenolic hydroxyl structure, suggesting antioxidant properties. Given that free radicals are known to induce oxidative damage to essential cellular components, an ESR study was conducted on curcumin and related molecules to analyze their ability to generate phenoxyl radicals. The ESR fast-flow technique was used to facilitate the studied compounds. Solutions of the studied compounds were prepared in mM concentrations, and Ce(IV) oxidizing solutions were prepared at 10% lower concentrations. Solutions flowed separately until meeting at a mixing flat cell in the ESR cavity to produce free radicals. Experimental spectra were analyzed using the NIEHS WinSim program. Density functional theory calculations on all studied compounds yielded theoretical hyperfine coupling constants as an aid to their assignment. Experimental HFCC were used to produce simulated spectra that closely matched the experimental spectra as indicated by correlation values approaching 1.0.

Session 1a

11:30 a.m.-12:30 p.m., Nichols Theatre

Mohima Anushi '26, Sweet Briar College

Examination of a Silicon Strip Detector in Support of Proposed Deuteron Charge Radius Measurements, Advisor: Dr. Forrest Frisen

The 6 discrepancy between the smaller deuteron radius measured by muonic deuterium spectroscopy and the larger value from electron scattering and spectroscopy experiments is known as the “deuteron charge radius puzzle” which is similar to the well-known “proton charge radius puzzle.” We made measurements to support the design of a recoil detector to be placed inside the target cell of the proposed DRad experiment at Jefferson National Lab to enable precise detection of low-energy recoil deuterons, ensuring the elasticity of the electron-deuteron (e-d) scattering process. A large-area silicon strip detector (SSD) was tested with alpha particles from a ^{241}Am source from room to cryogenic temperature in a vacuum chamber on the 59° beamline at the Triangle University Nuclear Lab (TUNL) Tandem Accelerator, using a custom-designed and fabricated aluminum plate to mount the detector to the cold head. The SSD had 756 AC-coupled strips combined into 16 channels, instrumented with a Mesytec MMR pre-amplifier to record the alpha spectra, for evaluating energy resolution. The detector’s energy resolution improved with decreasing temperature.

Matieya Johnson '26, Virginia Tech

Soil Microbial Community Composition Drives Variation in Collembola Effects on Beet Nutrient Content, Advisor: Dr. Ashley Jernigan

Soil organisms play a critical role in nutrient cycling and plant development. This study examines the effects of soil microbial communities and *Isotomiella minor* (Collembola) on *Beta vulgaris* (beet) growth and nutrient content. A greenhouse experiment was conducted using a randomized factorial design including two soil microbiome treatments—native (NMC) and pathogen dense (PDC)—and three minor abundance levels: none (NC), low (LC), and high (HC). Beets were grown until maturity and harvested to measure above- and below-ground biomass and nutrient content. LC abundance increased total beet biomass compared to NC, with the greatest root biomass production in the LC pots. The NMC soil produced more root biomass, but less above-ground biomass compared to the PDC soil. There was no evidence of disease on the beets in either microbial community treatment. In PDC soil, sodium, magnesium, and iron content of beet roots were greatest in HC and NC treatments. Conversely, in NMC soil, phosphorus and calcium showed lowest concentrations in the HC beet roots. Potassium and copper content was greater in PDC beet roots and zinc was greatest when Collembola were absent. Increasing Collembola abundance in combination with microbiome management may offer a sustainable strategy to improve crop quality.

Rue Pomeroy '27, Sweet Briar College

Hegemony or Oligarchy: Global Order in the Modern World, Advisor: Dr. Jeffrey E. Key

Hegemonic Stability Theory (HST) is the concept that having one dominant, militarily powerful nation leads to fewer wars among lesser nations, which fear disturbing the hegemon. Following the World Wars, Vietnam, and similarly bloody conflicts, international conduct has shifted more towards alliances (the United Nations, the North Atlantic Treaty Organization [NATO], etc.) which favor economic sanctions rather than direct military interventionism. This environment directly goes against the military nature of a hegemon. This project aims to ask the question: will groups of nations temporarily take on the role of a hegemon—as oligarchs, rather than hegemons? Groups such as BRICS show a possible methodology these oligarchs could follow to wield hegemonic power in a globalized world.

Lorelei Teeter '26, Sweet Briar College

A Bayesian Approach to Earthquake Forecasting Along Subduction Zones, Advisor: Dr. Stephen Loftus

Off the coast of the Pacific Northwest lies a large, locked convergent plate boundary known as the Cascadia Subduction Zone. Due to its locked state, this fault is capable of a major megathrust earthquake at any time, therefore it is important that we attempt to forecast major seismic events with relative accuracy. In this presentation, I will discuss a simplified Bayesian model designed to find the conditional probability of an Earthquake above a magnitude 6 having occurred along five major subduction zones on any given month. The Bayesian realm of statistics allows a relatively novel approach to earthquake forecasting due to its incorporation of priors and the treatment of parameters as random variables, which helps to account for the stochasticity of earthquake occurrences. Our previous model will act as a steppingstone to investigating the more complex ETAS model and how changes to the distribution will affect forecast efficacy.

Session 1b 11:30 a.m.-12:30 p.m., Klein Boardroom

Grant Baker '27, University of Virginia

Toward Characterizing the Biophysical Landscape of Immune Cell Plasma Membranes with a Novel Modular Toolbox, Advisor: Dr. Ilya Levental

Cellular membranes comprise hundreds of unique lipid species whose interactions result in a variety of membrane properties such as lipid packing, membrane thickness, and membrane fluidity. These biophysical properties, in combination with preferential sorting of lipids, regulate membrane-associated proteins which represent approximately 60% of drug targets and are encoded by more than 30% of the human proteome. Investigating the influence of local lipid environments—functionally termed the paralipidome—may provide revolutionary insight into fundamental biological mechanisms. For example, the Linker for Activation of T-Cells (LAT), a critical regulator of immune cell activation, is thought to be strongly modulated by its lipid environment. We present a modular HaloTag-based toolbox that integrates environment-sensitive fluorescent probes, previously applied to measure bulk membrane properties, to directly measure the biophysical properties of the paralipidome near specific proteins. We report successful implementation and validation of this approach and highlight ongoing progress in applying the toolbox to characterize the local lipid environment of T-cells before and after immune cell activation.

Hannah Peterson '27, Jack Parmley '26, Layla Viera '26, Isak Schwille '28, Virginia Tech

Sustainable Aviation Fuel's Effect on Fluorocarbon Viton O-rings, Advisors: Dr. Todd Lowe, Dr. David Gray

In response to the rapid expansion of commercial aviation, sustainable aviation fuels (SAFs) have been developed to mitigate soot and contrail formation, issues largely attributed to the aromatic content in conventional petroleum-based fuels. These biomass-derived alternatives are currently limited to a 50% Jet-A fuel blend to compensate for aromatic losses, hydrocarbons critical for maintaining key fuel properties, including seal swell characteristics. This study simulated the impact of Jet-A-HEFA-SPK fuel switching and various fuel blends on fluorocarbon O-ring seal integrity, a material considered highly resistant to chemical degradation. Post-exposure analysis was conducted using Thermogravimetric Analysis (TGA) and Dynamic Mechanical Analysis (DMA). TGA results revealed minimal fluorocarbon O-rings fuel absorption compared to nitrile seals; however, significant derivative mass loss shifts were observed during fuel switching, indicating elastomer chemical alterations. DMA results demonstrated that—while unexposed and Jet-A exposed O-rings maintained consistency—Jet-A to HEFA-SPK switching led to significant Young's modulus changes, indicating polymer backbone or cross-linking modifications. Finally, increasing aromatics to 12% in HEFA-SPK did not fully restore baseline mechanical properties, suggesting that the FAA-mandated 8% aromatic minimum may not entirely mitigate long-term material degradation risks, the collective results highlighting critical performance risks for engines transitioned from Jet-A to SAF fuel types.

Ciara Nauful '26, Sweet Briar College

Modeling the Academic Outcomes Associated with the Sweet Briar College Grants for Engaged Learning, Advisor: Dr. Stephen Loftus

Within this study we set out to gain insight on the efficacy and potential academic gain associated with the Sweet Briar College Grants for Engaged Learning (GEL Grants). Over the course of our research, we were able to develop two Bayesian statistical models in R to investigate probability impact on both graduation and retention at the institution. These models were able to not only provide valuable knowledge on probability of graduation and retention in relation to the GEL Grants, but also in association with other academic, monetary, and social factors that may impact those probabilities as well. We were then able to analyze which students might benefit the most from receiving the GEL Grant as well as confidently estimate just how impactful the grants might be.

Kendall Rander '26, Sweet Briar College

You Are What You Eat: Maize, Cannibalism, and Communion in the 16th-Century Guatemalan Highlands, Advisors: Dr. Lynn Laufenberg, Dr. Tracy Hamilton

This study examines how the K'iche' Maya reinterpreted the Catholic sacrament of Communion by utilizing their existing indigenous religious beliefs surrounding transformative elements, maize, and the human body. The Popol Vuh, the creation story of the K'iche', details how the world and humanity came to be. According to the text, their ancestors were made of maize, a staple of the K'iche' diet. With the body being made of maize, it is plausible that the eating of maize-based products was reinterpreted as a form of cannibalism. This process of transubstantiation would provide context for the K'iche' as they were introduced to the practice of Communion, where the Eucharist and wine become the body and blood of Christ.

Session 1c

11:30 a.m.-12:30p.m., Psychology Room 101

Cece Constantino '26, Sweet Briar College

Spiritual Warfare Ideology and American Political Beliefs, Advisors: Dr. Lynn Laufenberg, Dr. Campbell

This study was cultivated to look for a correlation between the modern ideology behind the evangelical doctrine of spiritual warfare and modern right-wing political beliefs. This paper considers the rise and changes of spiritual warfare ideology and its impact on the expansion of right-wing Christian politics in the United States. I started the study with an interview portion by reaching out to different area evangelical churches via email, which led to me interviewing evangelical pastors on their ideology of spiritual warfare. These interviews led to finding nine major beliefs commonly held throughout these churches. The main idea is that spiritual warfare compels congregants to actively fight and defeat ideology within politics through which they believe the Devil operates.

Sidney Ford '27, Sophie Labib, Virginia Tech

Comparative Analysis of Nerve Conduction Velocity and Threshold in Asian Jumping Worms and Canadian Nightcrawlers, Advisors: Dr. Ashley Jernigan, Dr. Zhuo Fu

Earthworms are beneficial soil organisms. When they are exposed to various pesticides, it can reduce their nerve conduction velocity (NCV). In this study, we compared NCV and the action potential generation threshold in Asian jumping worms (*Amyntas agrestis*) and Canadian nightcrawlers (*Lumbricus terrestris*). Asian jumping worms are an invasive species, while Canadian nightcrawlers are native to North America. Earthworms possess three major nerve fibers running along their bodies: one MGF (median giant fiber) which has a larger diameter, and two LGFs (lateral giant fibers) which are relatively smaller. When an earthworm receives a stimulus, if the stimulus is strong enough, it activates both the MGF and the LGFs. The signal then propagates along these fibers at different velocities. Our results showed significantly higher NCVs in Asian jumping worms (MGF: 19.8 m/s; LGF: 7.8 m/s; $n = 4$) compared to Canadian nightcrawlers (MGF: 12.9 m/s; LGF: 5.1 m/s; $n = 7$). The activation threshold was slightly lower in Asian jumping worms both in MGF and LGF. Our findings suggest that the faster NCV may help Asian jumping worms better withstand pesticide effects and respond more rapidly to threats, offering insights into invasive species resilience and potential strategies for their control.

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Gabby Hammond '26, Sweet Briar College

Shifting the Tide: Aboriginal Women Artists and Their Impact on the Art World, Advisor: Dr. Tracy Hamilton

My research focuses on the shift of inclusion of female Aboriginal artists in the 1980s that made an impact on collecting and the art market. I look at the change in Aboriginal communities that took place with the inclusion of female artists. I then explore how this change was perceived externally, by placing Aboriginal women's art into the context of the global art world and its many movements, such as modernism, postmodernism, and the feminist art movement. I am also interested in repatriation—the return of artifacts to the cultures that produced them—which has often been necessary because of how Aboriginal art was collected in the 20th century. I then discuss whether or not this inclusion of women into the Aboriginal art scene made an impact on repatriation efforts in European and American museums and institutions. My focus centers on the Kluge-Ruhe Art Collection in Charlottesville, VA, which hosts the largest collection of Aboriginal art in the United States and therefore provides a rich primary resource both in the work and the Aboriginal artists who exhibit there.

Connor Jones '26, Virginia Military Institute

Metagenomic Analysis of Microbiome Supporting Tardigrade Cryobiosis, Advisor: Emily Fadia

Tardigrades undergo a process known as cryobiosis when placed under extreme environmental conditions. This process has enabled them to survive the cold, vacuum-like environment of space. Multiple factors influence the process of cryobiosis and formation of a tun state that allows this survival mechanism. This experiment placed tardigrades into an extremely cold environment to then extract the surviving tardigrades' DNA and examine how the microbiome within influences the process of cryobiosis through the use of metagenomic analysis.

Ryan Abernathy '27, Longwood University

High Influence: From Puff to Peer Pressure, Advisor: Dr. Heather Kissel

Marijuana use can have harmful effects on adults of any age both physically and mentally, potentially leading to cardiovascular disease, mental health disorders, and addiction (Hasan, 2023). While there is not one reason someone might consume more or less marijuana over their lifetime, biopsychosocial factors like heart rate variability (HRV), baroreflex sensitivity (BRS), personality traits, and social pressure can potentially influence someone's decision to use marijuana and their riskiness of use (Nayak et al., 2020; Cassidy et al., 2018). Using archival data, we calculated a multiple regression model predicting whether Root Mean Square of Successive Differences (a measure of HRV), BRS, impulsivity (positive and negative urgency), and peer group deviance (PGD) leads to more marijuana consumption in a sample of 124 young adults aged 18-29. The overall model was significant, $F(5, 69) = 5.64, p < .001, R^2 = 0.29$, but PGD was the only significant predictor of lifetime marijuana use ($\beta = 4.58, p < .001$). Having more friends that partake in deviant activities predicts higher lifetime marijuana use in young adults, suggesting interventions targeting peer pressure could reduce risky levels of use in young adults.

Session 2a

1:45 p.m.-2:45 p.m., Nichols Theatre

Indu Sharma '27, Sweet Briar College

Assessing NDB Project Performance: A Comparative Analysis, Advisor: Dr. August Hardy, Randolph College

The BRICS group (Brazil, Russia, India, China, and South Africa) established the New Development Bank (NDB) in 2015 as an alternative to traditional financial institutions like the World Bank (WB). While there has been much discussion about the BRICS challenging the global economic order, there has been little study of the actual performance of its projects funded by NDB. This study conducts a comparative analysis of infrastructure projects funded by the NDB and the WB. Using project evaluation data from four BRICS countries and the Principal-Agent Theory framework, it compares similar projects in sectors like urban rail, roads, energy, and rural development. The findings of this study show that NDB projects demonstrate a strong tendency to stay on budget and frequently meet or exceed output targets, particularly in less complex sectors, whereas World Bank projects place a greater emphasis on reporting social and gender impacts. The research highlights the trade-offs between efficiency and accountability and raises questions about whether newer institutions like NDB define and deliver on sustainability goals or use them for institutional positioning.

Chloe Burchett '26, Sweet Briar College

The Eunuch and the Empress: Jewelry and Gender in the Byzantine World, Advisors: Dr. Erin Pitt, Dr. Tracy Hamilton

This project explores the intersection of jewelry and gender in the Byzantine World around the years of 600 AD–800 AD. The sources covering these nearly 300 years of incredible change, socially and politically in Byzantium, paint a world of powerful men and subservient women kept inside the house. However, Byzantine texts were often prescriptive where it concerned women rather than descriptive. The material culture left behind by these women (i.e., jewelry) is incredibly illustrative of the lived experiences of women. This presentation will examine the actual processes of illuminating the lives of these women beyond the text using the elements of financial freedom, physical display and symbolic meaning associated with acquiring, owning and wearing jewelry. Additionally, this presentation will look at how this research can be applied to middle to lower class women and identities that exist outside the normative in Byzantine society such as eunuchs.

Christian O'Neill '26, Longwood University

Ukrainization in the Face of Russification: Nestor Makhno and Anarchism, Advisor: Dr. Yulia Uryadova

In 1917, the Russian state saw great political change as the communist Bolshevik party replaced the traditional monarchy. The ensuing Civil War, which lasted from 1918 to 1922, saw the Bolsheviks attempt to gain control over the territories that made up the former Russian empire. The Bolsheviks faced numerous opponents and resistance movements, including the Makhno movement, or Makhnovshchina, that emerged in Ukraine in 1917. This research focuses on Nestor Makhno, the prominent leader of the Makhnovshchina. Makhnovshchina was a major Ukrainian anarchist movement that combatted Soviet oppression and Bolshevik rule at the turn of the twentieth century. Besides violence, the movement's emphasis on Ukrainian literacy, anarchist ideology and education, rights to landed subsistence, and political autonomy served as a form of resistance against Soviet oppression. This research examines the complex impact of Russification policies in Ukraine, contributing to a better understanding of how Soviet policies functioned and how Soviet authorities dealt with the local Ukrainian population. This analysis uses primary accounts derived from members, associates, and witnesses of the Makhnovshchina, such as Peter Arshinov's *History of the Makhnovist Movement* and Nestor Makhno's own work, "The Manifesto of The Makhnovists." This work also uses secondary sources that discuss other aspects of the movement, such as its exceptional use of violence and the peculiarity of its political ideology.

Hayne Webster '27, Westminster College

Albert Speer: Defense at Nuremberg and What it Means for Humanity in the Future, Advisor: Dr. Russell Martin

Nuremberg was the site of a 1945-1946 war crimes trial, during which 22 men were brought before a tribunal to face charges of crimes, atrocities, and complicity by the Nazi Party during WWII. Defendants entered pleas of not guilty, with most of them stating that they were merely following orders. Albert Speer's plea was nuanced by an admission of the crimes and an apology for the atrocities of which he claimed to have either very limited or no prior knowledge. While defendants make a plea of their choosing, Speer's late-to-the-game apology is suspect. Whether or not Speer's mea culpa plea was truthful or an effort to escape punishment is impossible to know, but an analysis of Speer's own words shows that Speer was more than an architect who designed buildings. He was also a builder of his own legacy. Scholarship yields a complicated picture of Speer, and points to the likelihood that he walked a fine line between truth and defense, balancing his own ambitions with morality and duty.

Session 2b

1:45 p.m.-3:00 p.m., Klein Boardroom

Atty Bestwick '28, Sweet Briar College

The Decolonization of South American History in Relation to the Development of Pre-Empire Peru, Advisor: Dr. Erin Pitt

The focus of this research project is to problematize the Western imperial influence on the modern scholarly and popular narrative of Andean Peru through the close study of the pre-European contact cities of Caral-Supe and Cusco. Notable academic emphasis has been placed on the study of South American empires and their dramatic changes over the Spanish colonial period. These investigations overlook the integral early development of indigenous culture found in these sites. My examination of the indigenous architecture, art, and culture of pre-Columbian Peru aims to create a more accurate depiction of this period in South America. I plan to accomplish this by analyzing recent archaeological and historical research that has been completed at both sites, with a specific attempt to contact Ruth Shady Solis, a prominent Peruvian archaeologist who has conducted significant research at Caral-Supe. The importance of early indigenous sites such as Caral-Supe and early Cusco is their essential contribution to a larger understanding of global and comparative history. These pre-European contact communities served as a template for future indigenous American empires and shaped complex societies for thousands of years to come.

Hunter Cleland '26, Hampden-Sydney College

The Continuity of Christ: Tracing an Early Subordinationist Christology from its Jewish Roots, Advisor: Dr. Michael Utzinger

I argue that a high subordinationist Christology was the earliest and predominant formulation of Jesus's divinity prior to the Council of Nicaea. Moreover, I argue that the subordinationist Christology that defines the early Church's understanding of Jesus as Lord has direct continuity with a Jewish cosmology that serves as the conceptual foundations for the articulation of subordinationism as a doctrine, in opposition to alternative theories such as messianic veneration or adoptionism.

Alice Duncan '26 Sweet Briar College

The Relationship Between Heterosexual Sexual Scripts and Attitudes Toward Asexuals, Advisor: Dr. Tracy Hipp

Sexual script theory proposes that sexual behavior is influenced by context and prior expectations. Research into sexual script theory has identified heterosexual scripts, which are cultural scripts based on expectations of heterosexuality. Asexual people, who do not feel sexual attraction to others, might seem at odds with these scripts. Past research has found that people tend to hold negative attitudes toward asexual people. This study investigates whether there is a correlation between agreement with heterosexual sexual scripts and negative attitudes towards asexuals. A survey was conducted where participants responded to the Sexual Scripts Scale (SSS, Sakaluk et al., 2014) and the Attitudes Towards Asexuals scale (ATA, Hoffarth et al., 2016). A moderate, positive correlation was found between the two. In addition, there was no significant difference in scores between LGBTQ+ and straight respondents for agreement to heterosexual scripts. The implications are that addressing the sexual scripts one believes may help decrease prejudice towards asexual people. Further, heterosexual scripts seem to be relevant to an individual's beliefs no matter their sexual orientation. More investigation should be done to understand what aspects of heterosexual scripts relate to negative attitudes towards asexual people

Leah Partington '26 Sweet Briar College

Bound by Words: A Journal of Strangers; Revitalizing Sweet Briar College's Movable Type Collection, Advisors: Dr. Laura Pharis, Dr. Shawn O'Connor

During Sweet Briar College's Honors Summer Research program, I sought to revitalize Sweet Briar's movable type collection and to make it more accessible to students interested in typesetting and gilding. The project's culmination was the design and creation of a hand-bound book with the intention of being open-ended and collaborative for its future users. A cross between an artist's book and a journal, the book will serve as a means to repair and reignite friendships, build community, and share personal stories and encouragement. Split into three themed sections and guided by instructions, illustrations, decoration, and hand drawn and sewn typography, the journal is an open-ended canvas designed to build trust, inspire creativity, and create bonds between the chain of individuals that choose to participate in its journey. While mainly focused on building community through tangible media, the project also incorporates a website and blog to catalogue processes, showcase the book's journey and evolution, and to connect with participants.

Addison Compton '27, LezLye Mason '28, Randolph College

Small Project, Large Impact: a Case Study of Localized Tick Collection across an Urbanized Landscape in Lynchburg, Virginia,

Advisor: Dr. Erin Heller

Ticks are ectoparasites that pose significant health threats to humans and non-human animals. Different species of ticks can transmit a variety of diseases, such as Lyme disease and alpha gal, to name just a few. As urbanization continues to disrupt relationships between ticks and their non-human hosts and as more people populate urban areas, the potential for ticks parasitizing humans is increasing. This project aims to officiate what species of ticks are present and most abundant in various habitats within Lynchburg, Virginia's, heavily utilized urban areas. We employed tick dragging techniques in summers 2023, 2024, and 2025 to collect ticks at five publicly accessible field sites across three habitat types (grass, edge, and forest). Collected ticks were euthanized and morphometrically identified in the lab. Ticks morphometrically identified within the *Ixodes* genus were identified genetically to species using polymerase chain reaction techniques. Six species of ticks were collected, including: American dog tick (*Dermacentor variabilis*), Asian longhorned tick (*Haemaphysalis longicornis*), blacklegged tick (*Ixodes scapularis*), *Ixodes keiransi* (no common name), Lonestar tick (*Amblyomma americanum*), and rabbit tick (*Haemaphysalis leporispalustris*). Most ticks were collected from our forest subsites, followed by edge subsites and grass subsites. This research demonstrates that numerous species of ticks populate popular urban sites in Lynchburg, supporting the need to appropriately inform the public about tick-bite and tick-borne disease prevention. This study also documents a recent invasion of the Asian longhorned tick, which may pose additional human and non-human animal health concerns moving forward.

Session 2c

1:45 p.m.-3:00 p.m. Psychology Room 101

Kemka Ihemelandu '27, Georgetown University

ApoptiScope: A Computational Imaging Tool for Quantifying NK Cell-Induced Apoptosis in 3D Pancreatic Cancer Models, Advisor: Dr. Marwa Afifi

Pancreatic cancer, an aggressive malignancy with a poor prognosis, is often diagnosed at advanced stages, where current therapies—including promising immunotherapies such as natural killer (NK) cell therapy—show limited effectiveness. A major barrier to progress is the lack of reliable methods to evaluate therapeutic response. Specifically, assessing how NK cells induce apoptosis (programmed cell death) in 3D cancer models is difficult, as current workflows rely on subjective, manual inspection of complex multichannel fluorescence images. To address this, we developed ApoptiScope, an automated computational imaging tool designed to quantify apoptosis in 3D pancreatic cancer spheroids. Built with Python libraries such as scikit-image and TensorFlow, ApoptiScope segments apoptotic signals (Channel 4: AF647) within nuclear regions (Channel 1: DAPI) and outputs two quantitative metrics: apoptosis area and intensity score. We validated ApoptiScope on 120 images from Cal-27 spheroids co-cultured with genetically modified NK cells. The tool detected a significant 2.05-fold (104.9%) increase in apoptosis in high-responders compared to controls (mean score: 32.35), highlighting the NK cells' effectiveness. Deployed as a user-friendly, no-code web application on Hugging Face Spaces, ApoptiScope enables researchers without computational expertise to generate results in minutes, accelerating the screening and development of NK cell therapies for solid tumors.

Ashlynn Bennett '27, Virginia Tech

What Makes You Worry: Examining Parent and Child Predictors of Youth Anxiety Symptoms, Advisor: Dr. Rosanna Breaux

Intergenerational trauma is when the impact of trauma is passed across generations without direct exposure to the original event. Despite widespread effects of trauma, one robust outcome of both intergenerational and childhood trauma is anxiety. Children who experience childhood trauma are 1.9-3.6x more likely to develop an anxiety disorder. Given the genetic and environmental risk associated with parental anxiety, it needs to be accounted for when examining the role of trauma on youth anxiety. This study examined the role of parent and child trauma history and parent anxiety in predicting the anxiety symptoms of 68 youth (M age = 11.58 years). Additionally, we explored whether these relationships differed based on child age and sex. Multiple regression analyses revealed that childhood trauma was the only unique predictor of parent- (PR) and child-reported (CR) anxiety. Follow up analyses indicated that this was only true for female participants. Interestingly, for PR this association was only present for children, but for CR it was only present for adolescents. Parent anxiety symptoms were a unique predictor of PR-anxiety for children, whereas parent trauma history uniquely predicted CR-anxiety for children and male participants. The presentation will discuss these findings and their clinical implications.

Morgan Sikes '28, Jacey Wright '28, Randolph College

Impact of Element Layout on the Mechanical Behavior of FFF-Processed Glass Fiber Composites Structures, Advisors: Dr. Siavash Sattar, Dr. Peter Sheldon

3D-printed glass fiber-reinforced composites (GFRC) offer a lightweight yet high-strength alternative for structural applications widely used in aerospace and automotive industries. This study examines the mechanical behavior and fracture characteristics of GFRC fabricated using fused filament fabrication (FFF), focusing on the effects of printing parameters, material composition, and geometric structure to optimize additive manufacturing strategies. The study consists of two sections. The first examines the influence of layer height, infill density, and raster angle on the tensile properties of GFRC specimens. The second evaluates sandwich structures with GFRC face sheets, incorporating 3D printed honeycomb, hexagonal, and rectangular core designs with different infill densities under flexural loading conditions. This research examines how printing parameters and core structures in composite sandwich structures (CSS) influence the mechanical performance of GFRC, providing guidance for improving the design and manufacturing of high-performance composite components.

Mohima Anushi '26, Sweet Briar College

Examination of a Silicon Strip Detector in Support of Proposed Deuteron Charge Radius Measurements, Advisor: Dr. Forrest Frisen

The 6 discrepancy between the smaller deuteron radius measured by muonic deuterium spectroscopy and the larger value from electron scattering and spectroscopy experiments is known as the deuteron charge radius puzzle which is similar to the well-known proton charge radius puzzle. We made measurements to support the design of a recoil detector to be placed inside the target cell of the proposed DRad experiment at Jefferson National Lab to enable precise detection of low-energy recoil deuterons, ensuring the elasticity of the electron-deuteron (e-d) scattering process. A large-area silicon strip detector (SSD) was tested with alpha particles from a ^{241}Am source from room to cryogenic temperature in a vacuum chamber on the 59° beamline at the Triangle University Nuclear Lab (TUNL) Tandem Accelerator, using a custom-designed and fabricated aluminum plate to mount the detector to the cold head. The SSD had 756 AC-coupled strips combined into 16 channels, instrumented with a Mesytec MMR pre-amplifier to record the alpha spectra, for evaluating energy resolution. The detector's energy resolution improved with decreasing temperature.

Alyssa Morrison '28, Claudia Ramos Lopez '28, Austin Mason '27, Claire Cho '28, Sam Castellani '25, Junting Zhou '27, Virginia Tech
Chronic Effects of Trimethylamine N-Oxide on Mouse Hearts, Advisor: Dr. Jia-Qiang He

Trimethylamine N-oxide (TMAO) is a gut microbiota-dependent metabolite derived from nutrient precursors that are rich in meat and dairy products. An increasing number of animal and clinical studies has confirmed a strong association between the elevated plasma level of TMAO and cardiovascular diseases. This study investigates how TMAO modulates cardiac structure and function using a mouse model. C57BL6J/wild type (WT) and organic cation transporter-3 knockout (OCT3-KO) mice were treated with TMAO drinking water for 13 weeks, while the control mice were supplied with regular drinking water. After treatments, echocardiography and electrocardiograms were utilized while mice were under anesthesia to evaluate the cardiac structure and functional changes. Following opening the animal chest, the heart was enzymatically perfused to isolate single cardiomyocytes for analysis. Our preliminary study found that long-term feeding of TMAO to WT mice induced hypertrophic cardiomyopathy and heart failure evidenced by increased wall thickness, decreased ejection fraction (EF%), and abnormal ECG compared to the control mice. The same TMAO treatment did not alter the above parameters in OCT3-KO mice. Chronic treatment of TMAO deteriorates cardiac structure and function eventually leading to heart failure. The ongoing experiments using isolated single cardiomyocytes may provide mechanistic insight into TMAO-induced heart failure.

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Poster Session II, 3:00 p.m.-4:00 p.m., Hampson Commons

1. Angela Rojas '27, George Mason University

Secretory Mitophagy is a Novel Pro-Survival and Pro-Growth Mechanism for Neurofibromatosis Type 2 Cancers, Advisors: Dr. Marissa Howard, Dr. Lance Liotta

Neurofibromatosis Type 2 (NF2) is a hereditary cancer caused by a chromosomal mutation which induces loss-of-function of the tumor suppressor protein Merlin. The physical effects of the mutation-induced tumors include hearing loss, tinnitus, and a loss in balance. Currently, most therapies available are palliative and involve treatments to minimize pain and neurologic dysfunction, rather than destroying the cancer. There is a need to study new mechanisms of tumor growth. A hallmark of cancer is metabolic reprogramming. Under oxidative stress, mitochondria undergo changes (fission or fusion) to support the metabolic needs of the cancer. Mitophagy is the removal of damaged mitochondria regulated by mitochondrial fission molecules (FIS1 and PINK). The alternative pathway is known as secretory mitophagy, which is the export of damaged mitochondria into extracellular vesicles. My aim is to demonstrate the presence of Merlin, FIS1, and PINK1 within these vesicles and to establish secretory mitophagy as a key cellular adaptation that enables cancer cells to tolerate heightened toxicity while exporting tumor suppressor molecules, ultimately contributing to uncontrolled tumor growth. These findings could provide novel insights into tumor metabolic adaptations and identify potential therapeutic targets for disrupting cancer cell survival mechanisms.

2. Annie Rose Greenman '26, James Madison University

Community-Based Reproductive and Child Health Care in Winneba, Ghana, Advisor: Dr. Philip L. Frana

Reproductive and Child Health (RCH) is a medical program targeted at improving the health of mothers, children, and families broadly. Traditionally, in the United States health programs such as RCH take place within a hospital or clinic's walls, limiting the program's potential outreach due to patients' lack of access to care facilities, transportation, education, finances, and more. At Winneba Municipal Hospital in Winneba, Ghana, the physicians go to the patient. The providers on the RCH team leave the hospital daily to walk door-to-door, providing prenatal and postnatal care, family planning services, immunizations, nutritional support, and further health education. Expanding outreach in this community-based way yielded improved health outcomes for both mother and baby. Since my internship with Winneba Municipal's RCH team, I analyzed their community-based practices through the lens of patient advocacy and compared them to hospital practices common in the United States.

3. Hannah Blake '27, Espen Lunden '25, Virginia Tech

Spectral Warrior: Learning RF Through Gamification, Advisor: Dr. Chris Headley

Radio frequency (RF) concepts are inherently hard to learn, due to their complexity and invisible nature. Spectral Warrior is a Virtual Reality (VR) software system, built in partnership with the Naval Surface Warfare Center Dahlgren Division (NSWCDD), which tackles these issues by visualizing the invisible world of RF while sending its user through multiple gamified VR scenarios. Our scenario drops its user into an electric warfare (EW) search and destroy game. Built in Unreal Engine 5.5.4, this scenario has the user interfacing with a dynamic linear phased array, which they must utilize to locate and terminate incoming threats. This task is done via beam steering and beam forming concepts which the user picks up through configuring the phased array to scan its environment and to jam incoming missiles to protect their ship.

4. Rashday Choudary '27, Cassandra Tate '26, Virginia Tech, Dr. Julia Wulfkuhle, Dr. Emanuel Petricoin, George Mason University

Molecular Profiling of Stromal Components in Prostate Cancer: Leveraging LCM and RPPA to Examine Clinical Outcomes, Advisor: Dr. Rosa Isela Gallagher

Prostate cancer remains a significant health challenge, necessitating advanced methodologies for accurate diagnosis and understanding of its molecular makeup. The tumor microenvironment, particularly the stroma, plays a critical role in cancer progression and metastasis. In this study, we focus on characterizing the activation of the immune and DNA damage repair signaling pathways within the stromal compartment of prostate cancer tissue from a patient undergoing treatment with Pembrolizumab. By analyzing biopsies obtained at various stages of the treatment plan, we investigate the protein signaling changes in the microenvironment throughout the course of treatment. A total of nine biopsies were obtained at various stages of the treatment plan. Our analysis of the stroma cells revealed several markers exhibiting elevated activation levels, including FoxP3, MSH2, mTOR S2448, Histone H2A.X S139, B7-H4, CD3zeta, HLA-DR, HLA-DR-DP-DQ-DX, Granzyme B, and CD31-PECAMI. These elevated values may indicate higher activity from the patient's autoimmune response. Conversely, the markers Chk1_S345, STAT1_Y701, and PDL122C3 were not elevated, implying lower activity levels. Further research is needed to confirm our results.

5. Kathryn Curran '27, Virginia Tech

Evaluation of Binding and Intermolecular Forces of Chloramphenicol across Bacterial Ribosome PTCs, Advisor: Dr. Anne Brown and Anastazja Kiselka

Antimicrobial resistance is of concern as antibiotics become ineffective in treating infectious diseases, posing a potential global health crisis. To address this growing concern, a comparative study of the peptidyl transferase center (PTC) of three gram-positive bacterial ribosomes, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Deinococcus radiodurans*, was performed using computational methodologies. This analysis focused on chloramphenicol interactions within the PTC, using molecular docking to characterize intermolecular interactions. This determined whether interactions bind to similar nucleotides across the respective ribosomes, influencing antibiotic efficacy. Chloramphenicol inhibits bacterial protein synthesis through A-site binding in the 50S ribosomal subunit; this is well-documented in *D. Radiodurans*, but not in *L. monocytogenes* and *S. aureus*. Visualizing A-site and chloramphenicol interactions could affect antibiotic efficacy. A fingerprint analysis was performed, revealing consistent nucleotide interaction between chloramphenicol and nucleotides U-2483 through U-2485, highlighting conservation within the PTCs. Nucleotide U-2485 demonstrated hydrogen bonding with chloramphenicol throughout respective ribosomes, supporting the validity of chloramphenicol's binding pocket. A CavitOmIX analysis was performed, revealing a highly conserved structural alignment of the individual ribosomes. Therefore, conservation of the chloramphenicol binding pocket in the PTC across the ribosomes, which characterizes residue-level interactions, provides a structural rationale for the design of novel antibiotics targeting Gram-positive pathogens.

6. Caroline Dedecker '26, Andrew MacWilliams '25, Virginia Tech

Conformity to a Unanimous Majority: Impact of Gender, Advisor: Dr. E. Scott Geller

Solomon Asch's classic conformity study did not include women. This study replicated Asch's paradigm with the addition of participant and confederate gender as an independent variable. Specifically, we examined whether men and women conform differently depending on the gender of the confederates who provide social pressure by unanimously agreeing on an incorrect visual discrimination. Participants, along with a group of five male or five female confederates, are directed to pick one of three lines they believe is the same length as a reference line. Participants' answers are observed during critical trials when all confederates give obviously incorrect answers. We predict men will conform less to women than men, while women will conform more to men than to women. Preliminary data indicate an overall conformity percentage of 48%, which is notably higher than the conformity percentage of 32% reported by Asch. This was unexpected since today's society is more individualistic than in the 1950s when Asch performed his seminal study. Our study is still ongoing; no statistically significant results are available regarding the impact of gender on conformity. The eventual results will provide insight into how gender influences conformity in various group decision-making situations from the workplace to educational settings.

7. Maureen Habashy '26, Savannah Smith '25, Virginia Tech

Gratitude Expression and Parental Modeling as Predictors of Romantic Relationship Satisfaction, Advisor: Dr. E. Scott Geller

This study investigated the interplay between gratitude expression and parental modeling in shaping romantic relationship satisfaction, offering insight into relational well-being. Specifically, it explored how gratitude expressions modeled in participants' primary caregivers' romantic relationships influenced individuals' own expressions of gratitude in their partnerships. Additionally, the study examined demographic and contextual variables that may influence gratitude expression and perception, such as relationship length and type. A sample of 160 to 200 participants completed a survey that included the Couples Satisfaction Index (CSI), the Appreciation in Relationships Scale (APS), and a modified version of the APS assessing perceived caregiver gratitude expression. Results revealed a strong positive correlation between individuals' expressions of gratitude and their relationship satisfaction, supporting the main hypothesis. Participants who reported greater exposure to caregiver gratitude also tended to express more gratitude in their own romantic relationships, suggesting a positive intergenerational association. Although statistically significant, correlations between gratitude expression and contextual factors like relationship length and type were weak, indicating these variables may play a lesser role. Understanding what drives higher or lower levels of gratitude expression is a critical next step, as it can inform the development of targeted interventions to enhance relational well-being.

8. Emma Gervais '25, James Madison University

Using Community Resources to Promote Health and Development in Disadvantaged Children, Advisor: Dr. Michael J. Klein

Out of the 74 million children living in the United States, 11 million live in poverty. Within this group, a disproportionate number of these children come from non-White families, who are circumstantially trapped by barriers such as generational poverty, language barriers, and other obstacles. As an educator and caregiver, how can I help set these children up for success? How can these conversations be had with families in a way that is productive, while still being culturally competent? Through this observational study, I have found that there are resources everywhere for children living in these conditions; these pillars of community include local schools, playgrounds, and child-based non-profit organizations. When combined with culturally sensitive practices, educators can connect families to the help that they need, as well as serve as a resource themselves. Armed with this knowledge, educators and parents can work with each other to give children the best health and developmental outcomes, despite any obstacles they face.

9. Jacqueline Herrera '26, Jacob Holloway '24, Virginia Tech

Left on Read: A Mixed-Methods Analysis of the Effectiveness of Campus Sexual Assault Emails, Allison Tobar-Santamaría '20, University of Rhode Island (nonpresenting authors) and, Advisor: Dr. Meagan Brem

Universities utilize campus sexual assault (SA) emails to comply with the Clery Act. Limited research exists investigating the effectiveness of SA emails and if students read them. This study aims to ascertain helpful and unhelpful aspects of the SA emails and if differences emerge based on characteristics (e.g., race/ethnicity, gender, academic year). Participants ($n = 868$ undergraduates) completed open-ended questions within an online survey. Qualitative analyses showed the emails 1) spread awareness, 2) inform students of circumstances of SA, and 3) provide resources. Unhelpful aspects included 1) lack of content, accountability, prevention; 2) poor email structure; and 3) triggering. Chi-square analyses showed that second-year students are more likely to endorse awareness $\chi^2(4, N = 201) = 11.60, p = .02$, Cramér's $V = .24$; women (versus men) are more likely to endorse resources $\chi^2(1, N = 168) = 5.64, p = .018$, Cramér's $V = .18$ and accountability $\chi^2(1, N = 168) = 8.49, p = .004$, Cramér's $V = .23$; fourth-year students are more likely to report prevention $\chi^2(4, N = 201) = 11.60, p = .02$, Cramér's $V = .24$. Though findings indicate SA emails are helpful, improvements can be made to increase students' readership and subsequent benefits.

10. Addison Swenson '26, Virginia Tech

Behavioral Prompting to Increase the Use of Reusable Grocery Bags, Advisor: E. Scott Geller

Plastic bag use poses a global environmental problem, with an estimated five trillion plastic bags used annually. This applied behavioral science study evaluated the impact of behavioral prompting to reduce customers' use of plastic bags at two Kroger grocery stores. Undergraduate research students observed 6,653 customers and recorded their bag usage and each customer's age and gender. During baseline, only 16% of the shoppers used reusable bags and 74% used plastic bags, with usage being the highest among male and college-aged customers. The impact of two interventions was evaluated: 1) posters placed at the store exits reminding customers to use reusable bags and 2) vehicle hangtags reminding customers to bring reusable bags were handed to shoppers exiting the store and carrying their groceries in plastic bags. These low-cost and socially valid interventions were not significantly effective. Moving forward, the project is focusing on distributing free reusable bags designed with a holder and a keychain clip. This approach is intended to ensure that customers have access to a reusable bag, decrease the probability of forgetting to bring reusable bags when shopping, and encourage this desirable behavior by linking the use of returnable bags to an everyday routine such as carrying keys.

11. Tandsi Izadi '26, James Madison University

Ransomware Attacks on Food Distribution Systems, Advisor: Dr. Michael J. Klein

The goal of this project is to explore how ransomware attacks on food distribution systems can adversely affect the availability of nutritious food and public health. An isolated cyber incident can disrupt food distribution from suppliers to communities since technology controls inventory tracking, transportation logistics, and digital nutrition programs. Ransomware delays deliveries, increases food prices, and limits access to healthy meals especially for vulnerable populations that depend on school meal programs or food banks. As a result of these disruptions, food safety and nutrition can become a public health concern. The purpose of my project is to demonstrate how cybersecurity doesn't just protect data but maintains essential services like food distribution. To ensure reliable access to nutritious food even in the face of cyber threats, food supply chains need to strengthen their digital defenses.

12. Spencer Kearns '26, Virginia Tech

Detection of Racemized Amino Acids by NMR using (-)-Isobornyl Chloroformate as a Chiral Protecting Group, Advisor: Dr. Andrew Lowell

Enantiomeric racemization alters the desired properties of a target compound, so synthetic chemists must be vigilant to verify its absence to maintain product integrity. Accidental racemization of chiral compounds can prove costly, and detecting and correcting this mistake can be time-consuming and wasteful. Detecting unwanted epimerization is particularly challenging for molecules with only one chiral center, as enantiomers are indistinguishable through standard techniques like ^1H -NMR and HPLC; however, diastereomers can be differentiated through these methods. Therefore, adding a chiral protecting group to an epimerizable molecule, especially amino acids that only contain one chiral center, would allow racemization detection via ^1H -NMR. Toward this end, we are beginning to analyze the pairs of amino acids we successfully protected with isobornyl chloroformate (IBOC-Cl) with ^1H and ^{13}C NMR using a variety of different solvents to detect which shows the most significant difference. We expect that the additional chiral centers from the IBOC will give different properties for the diastereomers in NMR.

13. Julia Kerns '26, James Madison University

Evaluating Barriers and Solutions to the Digital Usage Divide, Advisor: Dr. Michael J. Klein

The digital divide remains a pressing issue, with 2.7 billion people lacking reliable access to technology. This gap between those with access to technology and those without exacerbates disparities in education, healthcare, and economic opportunity on a global scale. One aspect of the digital divide is the "usage divide," where people have limited opportunities to effectively use technology for meaningful purposes such as education, employment, and healthcare. By implementing solutions to bridge this usage divide, addressing affordability, availability, and accessibility of broadband connection and devices, we can enhance equitable access to higher-paying jobs and opportunities and, in doing so, reduce socioeconomic inequality. In promoting opportunities for all to use technology, we must acknowledge that access is a privilege often taken for granted. Many assume that everyone has equal access and the ability to use technology at a moment's notice for their benefit, but this is far from the case.

14. Nate Lambert '26, Virginia Tech

Investigating Land Use, Habitat Structure, and Sedimentation with GIS-Based Approaches in Toms Creek, Virginia, Advisor: Dr. Holly Kindsvater

Sedimentation is a common driver of habitat degradation in streams, changing species distributions, reproductive success, and overall health. Excess sedimentation is a common effect of modern land use practices including agriculture, forestry, and urbanization. This study sets out to recognize variations in sedimentation along Toms Creek, Virginia, to better understand the impacts of land use and habitat structure on sedimentation. Using ArcGIS Pro, land use was measured and analyzed to have no significant impact on sedimentation on a small watershed scale ($p > 0.05$). Habitat structure was categorized into distinct mesohabitats—riffles, runs, and pools—based on depth and flow velocity. Substrate composition, a critical component of freshwater habitat structure, was also measured. Fine sediment coverage across the streambed was measured in deciles. Results show significant differences in sedimentation across mesohabitats ($p < 0.01$), with pools accumulating the most sediments. Additionally, dominant substrate was significantly associated with sediment content ($p < 0.01$), indicating an opportunity to model sediment regimes using substrate compositions. These findings provide a novel description of Toms Creek's benthic structure and its relation to land use. Work in progress will examine the impact of sedimentation on macroinvertebrate abundance and taxon richness.

15. Jae Lee '26, James Madison University

From Code to Care: Communication in a Healthcare Crisis, Advisor: Michael J. Klein

Imagine going to the pharmacy to grab your prescription only to find out the system is down. That's what millions of patients faced during the 2024 Change Healthcare cyberattack, where personal data were leaked, prescriptions were delayed, and billing was disrupted. This crisis revealed more than just technical vulnerabilities—it also showed how poor business communication can worsen the impact of a breach. When stakeholders, patients, and providers are left uninformed, trust in the healthcare system fades. It's not always about creating a secure system; it's also about taking responsibility for patient's data privacy and security. This poster highlights how effective communication during cyberattacks—through timely updates and transparency—can reduce harm, preserve trust, and keep the focus on what matters most: protecting the people we serve and care for.

16. Kayla Martino '26, Jesse Newpol '27, Virginia Tech

Towards Efficient Brain-Computer Interfaces: Movement-Based Optimization of EEG Signal Training, Advisors: Dr. Chin-Hui Chen, Dr. Zhuo Fu

Brain-Computer Interfaces (BCIs) have the potential to revolutionize rehabilitation and assistive technologies. However, their effectiveness is often constrained by suboptimal training procedures. For BCIs to achieve optimal performance, it is essential to generate personalized training datasets for each individual, as the quality of this data directly impacts device accuracy. In this study, we employed an electroencephalography (EEG) headset to record brainwave activity from the motor cortex and investigated how movement characteristics influence training data quality and subsequent BCI performance. Pre-programmed software was used to capture the influence of grip strength and visual conditions on training efficiency. Results revealed that stronger grips enhanced training outcomes: Success rates increased from 50% with a soft grip to 59% with a hard grip. In contrast, closing the eyes reduced training efficiency compared to keeping them open, with success rates of 49% versus 59%, respectively. These pilot findings demonstrate that movement characteristics significantly affect the quality of training data and, consequently, the performance of BCIs. Optimizing training protocols could therefore provide a promising pathway toward improving brainwave interpretation and enhancing the real-world utility of BCIs neural signals associated with predefined physical movements.

17. Anya Merriman-Mix '27, Virginia Tech

Observational Determinants of Psychological Safety in Higher Education, Advisor: Dr. E. Scott Geller

Psychological safety (PS)—the degree of personal inclusion, contribution, and engagement one experiences—has been studied in industrial settings but not in college classrooms. Our initial research examined students' perceptions of PS in various college courses using a survey that students completed after experiencing a particular class. Results indicated that peer connections and classroom experiences are critical determinants of a student's average psychological safety score (APSS). However, it is possible that those APSS's were influenced by hindsight bias. The current ongoing study consists of two brief surveys distributed at the beginning and the end of the semester to compare class expectations with self-reported PS. Plus, a behavioral check sheet will be completed periodically in the class by undergraduate research students. The behavioral observers will record occurrences of teacher and student behaviors related to experiential teaching/learning to reveal determinants of perceived PS. The potential determinants of PS observed during class will include behaviors of the instructor that promote relevant student interaction, as well as the behaviors of the students that reflect engagement in the learning process or experiential learning. We expect higher APSS's in classes with instructors who applied experiential teaching/learning techniques that influenced student engagement in the learning process.

18. Alyssa Morrison '28, Claudia Ramos Lopez '28, Austin Mason '27, Claire Cho '28, Sam Castellani '25, Junting Zhou '27, Virginia Tech

Chronic Effects of Trimethylamine N-Oxide on Mouse Hearts, Advisor: Dr. Jia-Qiang He

Trimethylamine N-oxide (TMAO) is a gut microbiota-dependent metabolite derived from nutrient precursors that are rich in meat and dairy products. An increasing number of animal and clinical studies has confirmed a strong association between the elevated plasma level of TMAO and cardiovascular diseases. This study investigates how TMAO modulates cardiac structure and function using a mouse model. C57BL6J/wild type (WT) and organic cation transporter-3 knockout (OCT3-KO) mice were treated with TMAO drinking water for 13 weeks, while the control mice were supplied with regular drinking water. After treatments, echocardiography and electrocardiograms were utilized while mice were under anesthesia to evaluate the cardiac structure and functional changes. Following opening the animal chest, the heart was enzymatically perfused to isolate single cardiomyocytes for analysis. Our preliminary study found that long-term feeding of TMAO to WT mice induced hypertrophic cardiomyopathy and heart failure evidenced by increased wall thickness, decreased ejection fraction (EF%), and abnormal ECG compared to the control mice. The same TMAO treatment did not alter the above parameters in OCT3-KO mice. Chronic treatment of TMAO deteriorates cardiac structure and function eventually leading to heart failure. The ongoing experiments using isolated single cardiomyocytes may provide mechanistic insight into TMAO-induced heart failure.

19. Kilee Pearson '26, Virginia Tech

Investigating the Impact of Alexithymia on Empathy in Schizotypy and Autistic Traits: A Replication Study, Advisor: Dr. Lavinia Carmen Uscătescu

Alexithymia is mainly characterized by difficulty identifying and describing one's emotions. This study sought to replicate previous results on the moderating role of alexithymia on the relationship between empathy and schizotypal and autistic traits. We also expanded the analysis to accounting for sex differences. Our sample consisted of 68 young adults who were native German speakers from Salzburg, Austria. Using similar methodologies, we partially replicated previous results as well as found that those results remained significant when controlling for sex differences. Specifically, we confirmed previously reported negative correlations between alexithymia and schizotypal and autistic traits. Similarly, we partially confirmed a significant indirect effect of alexithymia on the relationship between schizotypal traits and empathy, as well as the absence of this relationship when accounting for alexithymia. We also replicated a significant indirect effect of alexithymia on the relationship between autistic traits and empathy, and this remained significant after accounting for alexithymia. There are several reasons why our replication may not have been entirely successful, such as differing assessment tools and scoring techniques.

20. Sid Podury '25, James Madison University

Behind the Response: Probability Theory in AI, Advisor: Dr. Michael J. Klein

Have you ever wondered why artificial intelligence seems to “think” when it answers your questions? The reason for this is that behind every response is a system built on math and probability. This project explores how large language models (LLMs) use concepts from probability theory to make predictions and form responses. Of particular importance is Bayes’s theorem, which allows the model to constantly update the LLM’s response position based on new information, similar to getting a new idea. Instead of simply memorizing information, these models calculate the chances of different words appearing next in a string of words and then selecting the most likely word to appear next. Through an exploration of how AI handles uncertainty in making these choices, I demonstrate how math helps AI sound natural and logical, thus providing a better understanding of how an LLM functions.

21. Effie Thomas '26, Meni Thomas '26, James Madison University

Marketing with Meaning: Merging Wellness and Communication, Advisor: Dr. Philip L. Frana

Effie Wellness is a platform I (Effie) created to share simple, accessible approaches to living a healthier and more balanced life. Through this account, I explore how wellness can be communicated in ways that feel authentic, inspiring, and relatable. Our poster highlights the role of intentional messaging in shaping positive perceptions of wellness and fostering genuine engagement. By combining creative communication with themes of balance, confidence, and self-care, Effie Wellness demonstrates how digital spaces can serve as both educational tools and sources of community. The goal of this project is to illustrate how meaning-driven communication can make wellness more approachable, while also showing the potential of personal initiatives to spark broader conversations about health and connection.

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22. Derek Yang '26, Collette Kendrick '26, Winston Churchill High School

Surrogacy Legislation in the United States: A Reproductive and Queer Justice Analysis, Advisor: Dr. Jacob Appel

The surrogacy legal landscape is highly uncertain; state regulations across the U.S. vary as strongly as international laws do. This paper examines the role of state regulations (and lack thereof) in surrogacy by applying reproductive justice and queer justice frameworks in tandem to multiple representative statutes. Through the simultaneous employment of these frameworks in its analysis of the distinctions between states with non-regulation, regulated enforcement, and prohibitory approaches to surrogacy, this study reveals that policies satisfying one framework often undermine the other. Namely, policies designed to support queer justice by expanding surrogacy access frequently subvert reproductive justice by stripping surrogates of medical autonomy and subjecting them to the risk of coercion. Simultaneously, restrictive policies that support neither queer nor reproductive justice ultimately harm both. Thus, this investigation argues the necessity of fusing reproductive and queer justice in surrogacy legislation to address the rights of both surrogates and the non-normative families that require them.

23. Ellie Townsend '26, Virginia Tech

Headphone Use and Gratitude Expression: Exploring the Impact of a Behavioral Prompt, Advisor: E. Scott Geller

Interpersonal gratitude—an expression of thankfulness to another person—enhances the wellbeing of those who give and those who receive a “thank you.” The use of headphones has increased significantly and may reduce interpersonal conversations and expressions of gratitude. The first phase of this applied behavioral science (ABS) study found 30% of 6,123 dining-hall customers wore headphones, and customers not wearing headphones (55% of 6,116 customers) were substantially more likely to express gratitude than customers who were wearing one headphone (8% of 6,116 customers) or two headphones (13% of 6,116 customers). This naturalistic ABS study was designed to determine the impact of a behavioral prompt on decreasing headphone use to increase gratitude expression. At two university dining facilities, trained research students systematically observed and recorded whether customers thanked their cashier and noted their headphone usage: none, one, or two headphones/earbuds. Like our previous findings, customers not wearing headphones were more likely to express gratitude (38% of 6,300 customers) than customers who were wearing one headphone (7% of 6,300 customers) or two headphones (12% of 6,300 customers). The prompt was not successful in decreasing overall headphone use (32% of 6,300 customers) and did not increase gratitude expression.

24. Mathias Becerra '27, Stanford University

Bridging the Digital Divide: Community-Driven Language Resources and Policy for Inclusive Standards, Advisor: Dr. Thomas Mullaney

Many language communities remain digitally marginalized due to a lack of standardized terminology, open linguistic data, and representation in tech policy. This project addresses these issues by leveraging community-driven terminology development, open data extraction, and policy research. We hypothesized that empowering communities to collaboratively define terms and contribute structured data would improve their participation in digital standards. To test this, we interviewed language leaders and technical experts, analyzed past terminology efforts, and mapped workflows used to build consensus. We also developed and piloted software tools to extract and structure translation data from open corpora like Meta's No Language Left Behind (NLLB) for potential contributions to the Unicode Common Locale Data Repository (CLDR). We also reviewed academic literature, conducted expert interviews, and co-authored briefs with organizations working on language inclusion and AI ethics. Our findings show that participatory and structured processes prepare communities better for digital contributions than unstructured processes. Our tools successfully extracted relevant terms from large datasets and formatted them to be used by native speakers. The policy briefs highlighted language-related digital challenges and proposed practical solutions. This project demonstrates that combining community leadership, technical innovation, and advocacy can support a scalable model for inclusion of underrepresented languages in global digital infrastructures for foundational educational tools.

25. Jacey Wright '28, Randolph College

Mechanical Behavior of Notched Aluminum Reinforced with Carbon Fiber via Wet and Vacuum Layup Techniques, Advisor: Siavash Sattar

This study investigates an effective reinforcement and repair strategy for aluminum components subjected to localized damage or stress concentration, conditions often leading to premature failure in aerospace, transportation, and infrastructure applications. The proposed method employs externally bonded carbon fiber-reinforced polymer (CFRP) laminates applied through a vacuum-assisted wet layup process to enhance mechanical performance and extend service life. Aluminum specimens with central notches were fabricated to simulate stress concentrators. Prior to bonding, surfaces were mechanically abraded and cleaned with solvent to improve interfacial adhesion. Two reinforcement configurations—2-ply and 4-ply carbon fiber layers—were applied using structural epoxy resin under vacuum pressure to ensure uniform compaction and minimize void content. Mechanical performance was evaluated through tensile testing of notched specimens and three-point bending tests. Results indicated that CFRP reinforcement significantly improved load-bearing capacity, crack resistance, and energy absorption. The 2-ply configuration yielded approximately 65% higher tensile strength and 80% higher flexural strength relative to untreated notched specimens, closely approaching the performance of unnotched aluminum controls. The vacuum-assisted wet layup technique thus demonstrates high potential as a lightweight, scalable, and cost-effective method for repairing or reinforcing damaged aluminum structures, offering enhanced durability and prolonged operational lifespan.

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