

28th Annual Westminster College

Student Research Symposium



April 18, 2024
3:30-5:00 p.m.

*Wine Hall
Westminster College*

2024 Spring Research Symposium

April 18, 2024
3:30-5:00 p.m.

*Win. e Hall
Westmont. College*

One of the hallmarks of Westmont College's academic program is the opportunity for undergraduate

PARTICIPANTS

Lilia Allen '24

Chemistry

Poster #5

Sofia Alvarado '24

Psychology

Poster #1

Sarah Bean '24

Psychology

Poster #4

Nolan Brandt '24

Biology

Poster #8

Anneline Breytenbach '24

Psychology

Poster #16

Kennedy Burkett '26

Psychology

Poster #21

Sophia Chan '25

Chemistry

Poster #20

Joseph Chandra '24

Psychology

Poster #23

Mason Feagin '25

Biology

Poster #18

Isabella Felix '26

Sociology

Poster #3

Natalie Fogg '24

Physics

Poster #10

Noor Guefroudj '24

Chemistry

Poster #15

Ciboney Hellenbrand '24

Kinesiology

Poster #13

Aidan Holly '24

Psychology

Poster #19

Alan Lopez '26

Chemistry

Poster #3

Karla Munoz '24

Sociology

Poster #6

Jane Nakamura '24

Kinesiology

Poster #8

Jordan Ogawa '24

Chemistry

Poster #12

Emery Oneale '24

Psychology

Poster #11

Jong Min Park '24

Kinesiology

Poster #22

Mariyan Popov '24

Chemistry

Poster #20

Riley Potter '24

Sociology

Poster #17

Daniel Rafeedie '24

Kinesiology

Poster #13

Anna Scheider '25

Kinesiology

Poster #13

Elise Short '25

Communication Studies

Poster #9

Isabella Tejada '24

Psychology

Poster #7

Reese Toepfer '26

Physics

Poster #14

Jackson Zerwas '26

Chemistry

Poster # 3

ABSTRACTS

Lilia Allen '24

Logan Jackson '24

Harrison Bruggeman '23

Rachel Lorson '22

Dr. Brandon E. Haines

Chemistry

Sofia Alvarado '24

Sarah Remland '25

6. Does HRV Moderate the Relationship between Asian Americans and Working Memory in the Presence of Microaggression Administered by Racial In-group and Out-group Researchers?

This study was intended to simulate, in a controlled setting, the impact of real-world racial discrimination on Asian/Asian American well-being. We sought to see how HRV, a biomarker for emotional regulation, might predict performance on the working memory test (n-back [2-back and 3-back]) after being placed in a mildly “stressful”, micro-aggressive conversation with the researcher. Asian participants were assigned to either a White (racial out-group) or an Asian (racial in-group) researcher. Prior to taking a working memory test, participants were met with questions regarding their family origin and comments regarding how articulate they were and how “their people” typically performed well on the working memory test. These questions and comments were intended to emulate the stereotypes that Asians and Asian Americans face in the real world. We expected to see a correlation between HRV and working memory score, and we expected participants performing under the White researcher to have a lower working memory test score.

7. Unveiling the Electric Heartbeat: Computational Insights into SARS-CoV-2 Spike Protein Impact on Cardiomyocyte Signaling

The spike protein of SARS-CoV-2 exhibits specific binding to ACE-2 receptors on select neuronal types, potentially facilitating infection and subsequent damage. This study aimed to explore the impact of SARS-CoV-2 spike proteins on the signaling activity of cultured mouse cardiomyocytes using micro-electrode assays. Computational analysis, facilitated by RStudio, processed electrical data recorded by the MEA throughout the experiment. Results revealed a

9. Why is Cerorubenic Acid more stable than its isomer Isocerorubenic Acid? A Computational Study of Ring Strain in a Novel Polycyclic Core Structure

Cerorubenic acid is a sesterterpene that has sparked the interest of researchers due to its potential to be developed as a therapeutic agent. It has a unique tetracyclo[8.4.1.0.0]pentadecane polycyclic core structure with two isomers, cerorubenic acid and isocerorubenic acid, that differ based on the position of a bridgehead double bond, making them both surprisingly stable anti-Bredt compounds. In this work, density functional theory (DFT) calculations are used to investigate the stability of the unique polycyclic core structure and the relative stability of cerorubenic acid and isocerorubenic acid. It is found that cerorubenic acid is more stable than isocerorubenic acid by 2 kcal mol⁻¹ due to differences in conformational effects.

Noor Guefroudj '24¹
Sidney Wilkerson-Hill²

Dr. Brandon E. Haines
Chemistry¹

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Westmont College, Santa
Barbara, CA;

²Department of Chemistry,
University of North
Carolina at Chapel Hill,
Chapel Hill, NC

10. Autoagglutination of *Bordetella* bacteria depends on the composition of the growth media

Bordetella bacteria cause respiratory tract infections in mammals, and one species, *B. pertussis*, is the causative agent of the human-specific disease whooping cough. In our lab, we are trying to determine how *Bordetella* infect and survive in the respiratory tract, and many years ago we discovered a genetic switch, called PlrSR, that helps the bacteria accomplish that goal. During a study into how PlrSR exerts its specific function, we observed that when grown under certain conditions, the bacteria clump together, or “autoagglutinate,” in the culture tube. Since autoagglutination in *Bordetella* is known to be dependent on the FHA surface protein, we investigated if FHA levels change when the bacteria autoagglutinate vs when they do not in the growth media.

Nolan Brandt '24
Eden Hagen '24

Dr. Steve Julio
Biology

11. Effect of Subliminal Priming and Achievement Motivation on Advertising Effectiveness

Subliminal priming has long been investigated as a potential way to influence consumer behavior and choices. Priming below the conscious level of awareness is most effective particularly when coupled with a specific “need-state” such as hunger or thirst. Research on achievement motivation has shown that this type of motivation is a stable trait as opposed to a cognitive state that can change over time. Effects of subliminal priming on trait-like features such as achievement motivation have yet to be studied. In the present paper, participants underwent subliminal priming of achievement motivation-related words and then chose between two differently themed (neutral and achievement-related) products. It was hypothesized that those who undergo achievement motivation priming and are higher on the achievement motivation scale will be most likely to choose achievement-related products. Future research could aim to develop ways in which achievement motivation can be increased over time.

Aidan Holly '24

Dr. Gewnhi Park
Psychology

15. The Effect of ADHD on the Cognitive Profile of Patients with Alzheimer's Disease

Emerging research has been revealing intriguing connections between neurodevelopmental and neurodegenerative disorders. Due to an overlap in deficits between Alzheimer's disease (AD) and attention-deficit/hyperactivity disorder (ADHD), the most common neurodegenerative and neurodevelopmental disorders, respectively, this study sought to determine how ADHD alters the clinical presentation of AD. Patients completed a clinical interview and a series of neuropsychological assessments to examine significant differences in all cognitive domains (e.g., memory, attention, language functioning) between patients with AD alone and those with both AD and ADHD. The findings of this study can provide essential information for the diagnosis and treatment of individuals with AD. If psychologists are aware of the connection between the disorders, they can recognize early signs of AD that may be attributed to ADHD. Finally, this research could further the body of scientific evidence

21. Psychosocial and Physiological Factors that Modulate the Association Between Adverse Childhood Experiences (ACEs) and Emotion Regulation

Adverse Childhood Experiences (ACEs) have been known to influence an adolescent's vulnerability to depression. This study examined the psychosocial and physiological factors that would influence the association between ACEs and vulnerability to depression. We hypothesized that one's ability to regulate emotion—emotion regulation—would mediate the relationship between ACEs and depression scores. Data was collected from fifty participants from Westmont College. We measured participants' baseline heart rates using the BIOPAC System, and then participants completed the questionnaires that assessed ACEs, Emotion Regulation Questionnaire (ERQ), and Beck's Depression Inventory. We also examined the relationship between ACEs, depression, emotion regulation, and heart rate. The results showed that emotion regulation mediated the relationship between ACEs and depression. Also, participants with a high level of ACEs had a higher heart rate, poor emotion regulation skills, and higher depression rates compared to those who did not experience ACEs. This study helped us understand that emotional regulation played an important role in mediating the relationship between ACEs and depression and provided a physiological correlation of high ACEs.

22. Quenching the Octupole Rotational Band in ^{71}Ge

