

**Abstracts by McNair Scholars
at the University of Oregon**

**Thank you, Sweetie! Gratitude and Relationship
Satisfaction in Close Relationships**

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Positive psychology, which focuses on factors that enrich life, is a rising sub-field of psychology; within that subfield, gratitude is a topic receiving much attention. Previous research has shown that expressing genuine gratitude is an effective way of brightening interpersonal connections. With these discoveries in mind, this research explores how even brief expressions of gratitude can affect close relationships between an individual and a partner, family member, or friend. The Relationship Assessment Scale (RAS) and other assessment tools make it possible to measure relationship satisfaction both before and after a brief gratitude exercise. By completing a basic personality assessment, participants help to establish a baseline that may be used to compare results and determine correlations, if any, between personality, overall relationship satisfaction, and the gratitude intervention. We expect the results of this study to complement the mounting evidence of the effectiveness of even small exercises of gratitude.

The Role of CASK in Synaptogenesis

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The normal function of synapses requires the transport, recruitment, and stabilization of synapsin at developing presynaptic terminals. Late recruitment of synapsin to nascent synapses is regulated by cyclin-dependent kinase 5 (Cdk5), but the downstream effects of Cdk5 remain unknown. Calcium/calmodulin-dependent serine kinase a (CASKa)—a potential target of Cdk5 phosphorylation—was examined in the developing spinal cord of zebrafish embryos. Those embryos expressing a non-phosphorylatable analog of CASKa protein exhibited a significant reduction in touch sensitivity when compared to controls. Aberrant functioning of the CASKa analog in humans (CASK) has been linked to defects in synapses and other neurodevelopmental disorders, including microcephaly and X-linked intellectual disability. These results suggest that the CASK-kinase interaction may serve as a novel target for the remediation of CASK-associated disorders in humans.

More Than Just Words: EMOTAIX-Tropes Examines Linguistic Correlates of Mental Health

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Given the fundamental role of language, the words people use reveal how they encode memories and interact with others. Because maternal depression and anxiety influence parenting behaviors and may lead to adverse child outcomes, examining the language use of at-risk, expectant mothers may help broaden our understanding of the relationship between how language is used to process emotions and reveal mental health outcomes. EMOTAIX-Tropes, a text-analysis software program for assessing the emotional lexicon, allowed us to examine the use of emotion language during the Adult Attachment Interview (AAI). Also, participants completed questionnaires to assess current mental health symptomatology. From the overall sample ($N = 105$), we used a subsample of 46 primiparous mothers. Analysis revealed a positive correlation between the use of words denoting aggression/hatred and the symptomatology of depression, anxiety, and trauma. Unexpectedly, there was a positive correlation between alexithymia and the use of both positive emotion words and total emotion words. These findings further our understanding of the link between emotion language and mental health and suggest how future analyses may more closely examine the specifics of these associations.

**Of Cost and Consequence:
Examining the Price of White Liberalism
in James Baldwin's *Another Country***

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James Baldwin's 1962 novel, *Another Country*, intimately portrays the relationships of a racially mixed group of friends and lovers living in New York in the middle 1950s. Primarily concerned with the struggles and nuances of racial reconciliation, the novel's African-American protagonist, Rufus Scott, commits suicide less than one hundred pages into the novel, leaving the remaining characters to grapple with his sudden death and the forces that drove him to his demise. This paper explores the ways in which *Another Country*, written at the height of the Civil Rights Era, foretells the failings of post-racial America and investigates Baldwin's depiction of white liberalism as a force that counterintuitively stifles racial progress.

Gangs in America: Dispelling Detrimental Stigmas and Cultivating Alternatives

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Society's view of gangs and gang injunctions as elements of organized crime restricts the societal response to police action and limits positive actions from the community. This approach has not been effective as gangs continue to thrive in the face of death, incarceration, and high recidivism rates. This research examines an alternative idea that gangs might be productively viewed as organizations that emerge to meet the needs of a specific segment of individuals who live in deprived socio-economic communities. To be effective, a gang has to develop the leadership skills of individuals both to cope with and control the defiant individualistic characteristics of its members. To explore how gangs recruit and retain membership and how they promote leadership skills, this study employs a qualitative approach based on in-depth interviews of gang members in Oakland, California. The results of this study may improve our understanding of the relationship between a gang and its members, improve methods of studying gangs, and have implications for policies to create more effective alternatives to gang membership.

The State Effects of Subtle Physiological Arousal on Visual Working Memory Capacity: Sitting, Standing, and Cognition

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Past research on the effects of acute physiological arousal on neuronal function has repeatedly shown that simple sensorimotor reaction times are significantly improved immediately following near maximal level exercise loads. Little work has been done, however to assess the effects of less strenuous, concurrent arousal on the more complex functions of working memory. Using cognitive tasks developed to estimate visual working memory capacity (VWMC) in both sitting and standing positions, the current study examines the effects on VWMC of subtle physiological arousal provided simply by standing versus sitting. Results indicate that there is no significant difference in VWMC for either condition. While not significant, the results of this study may still assist to constrain theory in this area of study by helping to establish the threshold of physiological arousal's effects on cognition. Results may also address recent revelations that chronic sedentary behaviors, and prolonged occupational sitting in particular, are strongly associated with deleterious health outcomes independent of leisure time physical activity or the overall level of fitness.

The Role of Pupil Dilation in the von Restorff Effect

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Recent studies have shown that the role of pupil dilation is important for cognitive processes during learning and recall. The current researchers have revealed an interesting relationship between pupil dilation and attention levels, finding that larger pupil dilation is indicative of higher attention levels. This study investigates how novelty is reflected in pupil dilation and how attention levels can be shifted to other items on a word list by including an isolated item on a list of semantically related words. We hypothesize that this isolation, or von Restorff item, will increase pupil size during encoding and that this will lead to better recall. Preliminary behavioral results confirmed the von Restorff effect and showed that the distinct items were recalled more accurately than the non-distinct items on the control lists. Interestingly, the primacy item was still recalled first while the last item (i.e., the most recent) was recalled most accurately when made distinct. Further analyses will reveal if this heightened accuracy of the last item is also reflected in pupil dilation.

Screening the Neurotoxic Effects of Amyloid- β_{1-42} Peptides in *C. elegans* using a Micro-fluidic Electropharyngeogram Platform

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Alzheimer's disease (AD) is an irreversible and progressive neurodegenerative disease. Clinically, it strips memory and cognitive performance from patients while increasing deposits of toxic amyloid-beta ($A\beta_{1-42}$) peptides and neurofibrillary tangles of tau protein in the brain. Existing treatments for AD have limited effectiveness, making it vital to accelerate the search for new therapeutic compounds, possibly by examining the neurotoxicity of $A\beta_{1-42}$ oligomers. A preliminary study has suggested that feeding, *in vivo*, the neurotoxic $A\beta_{1-42}$ oligomers to *Caenorhabditis elegans* may inhibit the normal frequency of pharyngeal pumping. Using that earlier project as a starting point, this project tested the toxicity of $A\beta_{1-42}$ oligomers by examining the effect on the pharyngeal pumping frequency of *C. elegans*. Results showed that the $A\beta_{1-42}$ oligomers inhibited pharyngeal pumping in a dose-dependent manner after two hours of feeding. These results suggest that implementing a new microfluidic electropharyngeogram (EPG) platform may be a powerful tool for identifying the cellular and molecular mechanisms of the $A\beta_{1-42}$ oligomers and discovering drugs to treat Alzheimer's disease.

Facial Symmetry and Health in the Indigenous Amazonian Shuar of Ecuador

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Recently, several publications have suggested that facial symmetry and its attractiveness correlate with perceptions of health or “good genes.” Research also suggests that the relationship between symmetry and attractiveness may be used as a cue in making judgments about apparent health based solely on facial symmetry. Yet, actual evidence of facial symmetry and its connection to health or stress have been relatively unstudied. The minimal research that has been done has produced questionable results and still leaves room for much to be determined and tested. Various publications have attempted to link asymmetrical traits and their cause to an inability to resist the harmful effects of pathogens, mutations, and toxins experienced during development. Fluctuations in asymmetry have also been associated with a loss of fitness and with the assertion that, across many species, individual males experience a greater reproductive fitness when characterized by a highly symmetrical phenotype.

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Facile Synthesis of a Large Gallium Keggin Cluster

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Group 13 metal clusters have been of interest in both materials chemistry and geochemistry because those substances occur naturally and make excellent precursors to thin films for various devices, including solar cells and laptops. Studying the synthesis of these clusters may provide a better understanding of the natural mechanism of synthesis and assist in finding more efficient ways to manufacture the clusters for use in devices. One way to synthesize the clusters is to use 2,6-naphthalene disulfonate in a supramolecular mechanism to promote cluster crystal formation, a method first developed by Tori Forbes in 2012. In the current research, the crystallized clusters were analyzed and verified by the Advanced Light Source at Lawrence Berkeley National Laboratory.

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Alternative Splicing in the Cardiac Tissue of Myotonic Dystrophy Type 1 Patients

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Myotonic dystrophy type I (DM1) is an autosomal dominant neuromuscular disease caused by the expansion of CTG repeats in the 3' untranslated region of the DMPK gene. Transcription of the pathogenic DMPK gene subsequently produces toxic RNA molecules that form nuclear foci and sequester splicing factors, such as the MBNL family of proteins, causing many RNA transcripts to be spliced improperly. Current literature suggests that widespread missplicing drives many aspects of DM1, including insulin resistance and myotonia. Because cardiac abnormalities are the second leading cause of death for those with DM1 and because missplicing also occurs in cardiac muscles, further study is important. To analyze and characterize the missplicing events in cardiac muscles, this study used the cardiac tissue and derived RNA from nine DM1 patients and three healthy control individuals. Analysis revealed that numerous alternatively spliced exons are differentially included in DM1-affected heart tissue relative to controls. Several of these misspliced exons are within genes that previous research has implicated in the pathogenesis of dilated cardiomyopathy (DCM). Analysis identified genes that, when disrupted, are associated with both dilated cardiomyopathy and DM1. Although further inquiry will be required to understand the roles of particular exons in each disease, this research represents a step toward explaining the mechanisms of premature death in DM1 patients.

A Protocol to Purify and Determine the Protein Concentration of Malaria Vaccine Candidate Antigen Apical Membrane Antigen-1 (AMA1)

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Nearly half of the world's population may be at risk of malaria, with children in sub-Saharan Africa at highest risk for morbidity and mortality. Malaria caused by *Plasmodium falciparum* is the most severe and the major cause of malaria-related mortality. Apical membrane antigen-1 (AMA1) is a leading *P. falciparum* blood-stage vaccine antigen because anti-AMA1 antibodies inhibit erythrocyte invasion. In a recent vaccine trial, a monovalent AMA1-based vaccine showed high allele-specific efficacy against clinical malaria and was the first example of a blood-stage vaccine with measurable protection. However, limited information about the extreme antigenic diversity of AMA1 highlights the need for new methods to study AMA1 epitopes. An *E. coli* autotransporter, EspP, was engineered to display regions of AMA1 and their variants. The expressed proteins are printed onto high-throughput protein microarrays, but it is necessary to develop a method for determining the concentration of AMA1-autotransporter proteins. Ultimately, human sera of individuals obtained pre- and post-malaria season and pre- and post-receipt of AMA1 vaccine FMP2.1/AS02A will be reacted with the protein microarrays. Information on seroreactivity to AMA1 epitopes allows the identification of cross-protective

epitopes. Knowledge of immunologically relevant regions of AMA1 is key to developing a broadly protective AMA1-based malaria vaccine.

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