OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02/28/2023)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.

Follow this format for each person. DO NOT EXCEED FIVE PAGES.

|  |
| --- |
| NAME: Mitchell, William |
| eRA COMMONS USER NAME (credential, e.g., agency login): |
| POSITION TITLE: Predoctoral Student |

EDUCATION/TRAINING

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| INSTITUTION AND LOCATION | DEGREE (if applicable) | START DATE MM/YYYY | END DATE MM/YYYY | FIELD OF STUDY |
| Loyola University Maryland, Baltimore, MD | B.S. | 08/2010 | 05/2014 | Psychology |
| Temple University, Philadelphia, PA | Ph.D. | 08/2019 | 05/2025 (expected) | Cognition & Neuroscience |

**A. Personal Statement**

My research interests primarily center around how neural and behavioral representations of affective phenomena mature through early development. I am specifically interested in the experience of uncertainty and how judgments of social certainty form over time. My proposed project uses video stimuli and representational similarity analysis to identify developmental differences in neural and behavioral representations of social uncertainty between adolescents and adults. To complete this project, I require training in computational methodologies to identify how the features of a complex multimodal stimulus inform these representations, and in social affective developmental neuroscience to mechanistically understand how the maturation of social and evaluative neural systems influence developmental differences in response to ambiguous information. My long-term goal is to be PI of my own affective developmental neuroscience lab at an R1 university and to study to social affective phenomena using computational methods and multimodal stimuli.

My post-baccalaureate research experiences established a strong foundation of technical skills and project management which will be necessary to complete my proposed project. Under the mentorship of Dr. Ryan Vandrey and Dr. Maxine Stitzer at Johns Hopkins University, I coordinated several behavioral pharmacology projects which primarily explored options to regulate the use of nicotine and cannabinoid substances. It was through Dr. Vandrey’s mentorship that I first learned to apply ecologically valid methodology to measure phenomena beyond the lab by using ecological momentary assessment techniques. I was crucial to the data collection and management process, as well as the collection of biospecimens. I was first introduced to neuroimaging literature under the direction of Dr. Eric Strain at Johns Hopkins as well, as I served as the sole editorial office manager, responsible for revising all accepted manuscripts and coordinating daily operations, for his journal, *Drug and Alcohol Dependence.* Following my time at Johns Hopkins, I accepted a position as a research coordinator at the Children’s Hospital of Philadelphia under the primary mentorship of Dr. Natalie Terry. Here I worked with clinical developmental populations to collect and manage data and biospecimens in service of developing an extensive biobank of human tissue for designing new gastrointestinal treatments. I also worked to survey the gut microbiome of children suffering from short bowel syndrome with the ultimate goal of developing a course of treatment for those suffering from the ailment.

I am currently a fourth-year doctoral student under the mentorship of Dr. Chelsea Helion, during which I have focused on studying neural and behavioral representations of affective phenomena using naturalistic stimuli. During my first and second years, I co-directed a project exploring how high-intensity quasi-naturalistic contexts influence memory, self-regulation, and physiology. I specifically wanted to understand how individuals self-regulate their emotions with minimal researcher intervention (Mitchell, *Under Review*). Across my first and second years as well, I led a reanalysis of a developmental neuroimaging dataset to explore differences in the representation of affective information using video stimuli (Mitchell, 2021). Across my third and fourth years, my interest has focused upon uncertainty; its affective experience and how individuals resolve it. A preliminary behavioral study I conducted assigns roles to adult participants (n = 46) and continuously assesses their certainty that a defined outcome will occur while watching video clips. This research suggests perspective moderates how uncertainty resolves over time by influencing how participants weigh and respond to ambiguous, but not non-ambiguous, information. An offshoot of this project, which most informs the proposed project, replicates the previously noted paradigm in the context of fMRI, but without role assignment, across a single, longer narrative, and in conjunction with additional measures to assess the influence of specific features and social/non-social domain specificity. This grants us greater resolution to explore how uncertainty resolves over time. Though data collection is ongoing (n = 26), preliminary univariate analyses highlight neural responses in our hypothesized regions and differences in responses between social and non-social tasks (see Fig. 1 in the proposal). While a promising first step, this data cannot speak to my specific interests in identifying the neural mechanisms that explain developmental differences in behavioral measurements of uncertainty between adults and adolescents. Furthermore, my current analytic skillset alone is insufficient to identify the unique and complex influences of multimodal features upon global representations of uncertainty, and thus additional training in computational methods and the neurodevelopmental affective literature is required.

I have crafted a comprehensive training plan to accomplish these goals in collaboration with my sponsors for this project, Dr. Jason Chein and Dr. Chelsea Helion. Dr. Chein directs Temple University’s Brain Research Imaging Center (TUBRIC) and is an expert on a diverse array of valuable neuroimaging techniques and tools, including function magnetic resonance imaging, brain stimulation, and eye-tracking. Through his research and many collaborations, he has developed a robust repertoire of expertise in social decision-making, self-regulation, and developmental neuroscience which will be invaluable to advising the project, my skill development, and interpreting the results of our studies. He has an extensive track record of producing talented, innovative neuroscientists and advising graduate NIH and NSF grant recipients. Dr. Helion directs the Social Affective Neuroscience lab and is an expert on the application of complex quantitative analyses. Through her involvement with programming outreach programs such as *Girls Who Code*, Dr. Helion also has extensive experience with programming tools in R and Python. Dr. Helion uses a wide array of naturalistic methodology to measure social, affective, and self-regulatory phenomena behaviorally and neurally, though, her research experience also includes the maturation of self-regulation networks across early development. This strong, technically-proficient mentorship team will ensure that I have the knowledge-base and computational tools to establish my unique, programmatic research line as an independent researcher.

Though my personal statement has thus far focused on why developing my expertise using computational methods and developmental neuroscience theory through this grant is crucial to my becoming a productive independent neuroscientist, equally as important to my goals is mentorship. Through my work co-directing Temple’s Coding Outreach Group (COG), I have built resources, infrastructure, and connections to teach others the programming skills they need to accomplish their own research goals. Importantly, we have done so while promoting open-science and open-source practices, ensuring that resources are never a barrier for learning. During this grant, I will expand the COG community to a wider, more experience-variant audience through expanded programming, outreach, and forming a more diverse board of operators. Managing this group grants me the opportunity to practice mentorship on a daily basis while ensuring the next generation of neuroscience researchers have the tools they need to succeed. My training goals include these plans to practice mentorship and lab management so that I can create a diverse and inclusive space for future trainees.

**B. Positions and Honors**

**Positions and Employment**

|  |  |
| --- | --- |
| 2013 - 2015 | Research Assistant, Johns Hopkins University, Supervisor: Ryan Vandrey, PhD., Maxine Stitzer, PhD |
| 2015 - 2017 | Research Coordinator, Johns Hopkins University, Supervisor: Ryan Vandrey, PhD., Maxine Stitzer, PhD |
| 2016 - 2018 | Editorial Office Manager, Elsevier (*Drug and Alcohol Dependence*), Supervisor: Eric Strain, M.D. |
| 2017 - 2019 | Research Coordinator, Children’s Hospital of Philadelphia, Supervisor: Natalie Terry, M.D., PhD. |
| 2019 - | Graduate Research Assistant, Temple University, Supervisor: Chelsea Helion, PhD. |

**Other Experience and Professional Memberships**

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| --- | --- |
| 2020 - | Member, Society for Personality and Social Psychology |
| 2020 - | Member, Social Affective Neuroscience Society |
| 2020 - 2021 | Teaching Assistant, Intro. Neuroscience, Temple University |
| 2021 - | Member, Flux Society |
| 2021 - | Member, Society for Affective Science |
| 2021 | Instructor of Record, Intro. Statistics, Temple University |
| 2022 - | Co-Director, Coding Outreach Group, Temple University |
| 2022 | Instructor of Record, Developmental Psych., Temple University |
| 2022 | Teaching Assistant, Intro. Statistics, Temple University |

**Honors**

|  |  |
| --- | --- |
| 2010 - 2014 | Dean's List, Loyola University Maryland |
| 2011 - 2014 | Presidential Scholarship, Loyola University Maryland |
| 2021 | Best Poster Award, SPSP Emotion Preconference |
| 2021 | Outstanding Poster Award, SANS Conference |
| 2022 | Graduate Travel Award, SPSP Conference |
| 2022 | Psychology Honors Mentor of the Year, Temple University |
| 2022 | Attendee, Neurohackademy, University of Washington |

**C. Contribution to Science**

1. **Neural Representations of Affective Phenomena During Early Development:** A core focus of my research has been exploring how normative development influences affective neural representations. In my first first-author manuscript, I applied hierarchical linear modeling (HLM) and representation similarity analysis (RSA) to data collected from a sample of adults and children who passively watched valenced video stimuli. I hypothesized children should demonstrate greater similarity in neural activation patterns relative to adults while assessing positive and negative affective information, and that these differences would be more pronounced in regions which undergo more structural changes during development. These findings would highlight that observed behavioral differences between age groups are also observable neurally using multivariate pattern analyses. In line with my hypotheses, we found that neural activation patterns within the ventromedial prefrontal cortex, which undergoes dramatic early-life development, demonstrated far more complex and idiosyncratic representations in adults relative to children (Mitchell et al., 2021). These age-related differences were more muted in sub-cortical structures (e.g., amygdala, nucleus accumbens) that undergo fewer structural developments. Affective representation maturation from relatively simplistic to more nuanced is in line with rational constructivist theories of emotional development. These typically hold that humans start with proto-conceptual primitives to emotion that mature over time. I am using a similar technique to examine the representations of regulated affective information in a pre-existing developmental sample of 116 children, adolescents, and adults, though this manuscript is still in preparation. Neural representations occupy a pivotal role for normative development. Identifying neural mechanisms that underlie observable behavior is an important step towards building comprehensive models which can explain why normative age-related behavioral changes occur and in which situations these normative developments might become of clinical significance.
2. **Mitchell, W.J.**, Tepfer, L. J., Henninger, N. M., Perlman, S. B., Murty, V. P., & Helion, C. (2021). Developmental differences in affective representation between prefrontal and subcortical structures. *Social Cognitive and Affective Neuroscience*, nsab093. https://doi.org/10.1093/scan/nsab093.
3. **Mitchell, W.J.**, Tepfer, L. J., Henninger, N. M., Perlman, S. B., Murty, V. P., & Helion, C. (2021). Neural representations of affective information across developmental contexts. Invited presentation to Yale University’s Fundamentals of the Adolescent Brain Lab.
4. **Mitchell, W.J.**, Satpute, A.B., Nook, E.C., Cosme, D.J., Helion, C. (2022). Contextualizing Emotion – Influences of Context on Affective Representation, Experience and Regulation*.* Symposium at the 2022 Annual Conference of the *American Psychological Association*, Minneapolis, MN.
5. **Measuring Decision Making Using Naturalistic Methodology:** A common theme present throughout even my earliest research experiences is an appreciation for ecological validity in study designs. In my post-baccalaureate position, I directed one of the twelve participating labs across the country to use ecological momentary assessments and other cognitive/biological measures to assess associations between reduced-nicotine cigarette usage and smoking behaviors, supporting the theory that reducing nicotine below a specific threshold would be a safe public policy decision to reduce addiction (Donny et al., 2015). This research informed the FDA’s decision to exert stronger regulatory control over cigarette content and, for me, highlighted the inherent value in modeling phenomena in the contexts in which they matter. My first predoctoral project leveraged the consistency and affective variability of a quasi-naturalistic context (i.e., a haunted house) to identify how strongly affective intensity informs the emotion regulation (ER) strategies people use when not trained or directed to regulate their emotions. This association is very strong in choice paradigms (r+ = 0.46 – 0.61) which train and prompt participants to regulate, but training and prompting may deviate from how ER occurs for the average person. Contrary to previous lab work, we did not observe an association between affective intensity and which ER strategies people used across two studies (n =57; n = 118). Our results suggest participants may use distraction less frequently and less efficiently than observed in choice paradigms which may explain the deviation. In a third study, we demonstrated that the association between affective intensity and ER choice reemerged when the same experiences were reformatted into a format that more closely resembled a choice paradigm (Mitchell et al., *under review*). These results can be especially important for informing trauma related treatments but also emphasize that diversity in task design is required to capture the full variability around complex affective constructs like emotion regulation or uncertainty.
   1. **Mitchell, W. J.**, Stasiak, J., Martinez, S. A., Cliver, K., Gregory, D. F., Reisman, S., … Helion, C. (*Under Review*). Emotion regulation strategy usage in a quasi-naturalistic context. *psyarxiv*. https://doi.org/10.31234/osf.io/23wtz
   2. Donny, E. C., Denlinger, R. L., Tidey, J. W., Koopmeiners, J. S., Benowitz, N. L., Vandrey, R. G., … Hatsukami, D. K. (2015). Randomized Trial of Reduced-Nicotine Standards for Cigarettes. *New England Journal of Medicine*, 373(14), 1340–1349. https://doi.org/10.1056/NEJMsa1502403
   3. **Mitchell, W.J.**, Stasiak, J., Gregory, D., Reisman, S., Murty, V., & Helion, C. (2020). Why We Regulate: Regulation Beyond the Lab. Invited presentation for the *Maladaptive Motivational Behavior Seminar Series* in Philadelphia, PA.
   4. **Mitchell, W.J.**, Stasiak, J., Gregory, D., Reisman, S., Murty, V., & Helion, C. (2022). Emotional Intensity Influences Prediction but not Action in Emotion Regulation. 2022 annual meeting of the *Society for Personality and Social Psychology.*
6. **Documenting Biological Systems in Childhood and Adolescence:** Through my initial post-baccalaureate experience, I developed a substantial research skillset, but was not able to work with developmental populations or observe biological systems. I thus transitioned to the Children’s Hospital of Philadelphia where I coordinated two microbiome projects. The first used human tissue, which I collected during endoscopies and resections, to generate a biobank of 150 enteroids, or replicable patient cells from diseased or non-diseased gastrointestinal tract tissue. This biobank provides an effective means of testing GI-related treatments without subjecting children to unjustified harm in the process. The second project surveyed gut microbiota in patients suffering from short bowel syndrome (SBS), which typically complicates the use of traditional antibiotic treatments and impacts developing health and cognition. In both projects, I was responsible for collecting, organizing, and maintaining all data and biospecimens, managing all regulatory affairs, identifying and interacting with eligible participants, and a portion of data curation. These efforts produced a recommended course of treatment for children with SBS on which I was a co-author.
7. Kastl, A., Zong, W., Gershuni, V. M., Friedman, E. S., Tanes, C., Boateng, A., **Mitchell, W. J**., ..., Wu, G. D. (2022). Dietary fiber-based regulation of bile salt hydrolase activity in the gut microbiota and its relevance to human disease. *Gut Microbes*, 14(1), 2083417. https://doi.org/10.1080/19490976.2022.2083417
8. Kastl, A., Zong, W., Gershuni, W., Friedman, E.S., Tanes, C., Boateng, A., **Mitchell, W.J.**,..., Wu, G.D. (2022). Clinical phenotyping of patients with short bowel syndrome via effects of diet and the gut microbiota on bile acids. Presented at the 2022 Annual Meeting for the *North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition.*

### D. Additional Information: Research Support and/or Scholastic Performance

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| --- | --- | --- | --- | --- | --- |
| YEAR | COURSE TITLE | | | | GRADE |
|  | Loyola University Maryland | | | |  |
| 2010 | AH111 | Survey of Art History: Renaissance to Modernity | | | B+ |
| 2010 | PY101 | Introductory Psychology | | | A- |
| 2010 | FE100 | First Year Experience | | | S\* |
| 2010 | WR100 | Effective Writing | | | A |
| 2010 | ST110 | Introduction to Statistical Methods & Data Analysis | | | A |
| 2010 | SN103 | Intermediate Spanish I | | | B |
| 2011 | HS101 | History of Modern Western Civilization | | | B+ |
| 2011 | SN104 | Intermediate Spanish II | | | B+ |
| 2011 | PY201 | Social Psychology | | | A |
| 2011 | BL105 | Introduction to Anatomy & Physiology | | | B |
| 2011 | AH312 | Art History: The Renaissance in Italy | | | B+ |
| 2011 | PL201 | Foundations of Philosophy | | | A |
| 2011 | SC103 | Sociology: American Society | | | A |
| 2011 | PY221 | Psychology of Learning | | | B- |
| 2011 | HS312 | History of Ancient Greece | | | B+ |
| 2011 | PY291 | Research Methods I | | | B+ |
| 2012 | TH201 | Introduction to Theology | | | A |
| 2012 | PL202 | Philosophical Perspectives: Project Modernity | | | A |
| 2012 | PY254 | Psychology of Women | | | A |
| 2012 | PY292 | Research Methods II | | | A- |
| 2012 | EN101 | Understanding Literature | | | A- |
| 2012 | PY202 | Psychopathology | | | A- |
| 2012 | PY255 | Psychology of Religion | | | A- |
| 2012 | PY421 | Forensic Psychology | | | A- |
| 2012 | TH266 | Christian Theology & World Religions | | | A |
| 2012 | PY412 | Evolutionary Psychology | | | A- |
| 2012 | PY353 | Contemporary Issues in Psychology | | | A |
| 2013 | PL220 | Philosophical Perspectives: Art & Imagination | | | A |
| 2013 | PY203 | Psychology of Personality | | | A- |
| 2013 | PY415 | Psychological Systems & Theories | | | A |
| 2013 | CH110 | Chemistry and Society | | | A |
| 2013 | PL314 | Environmental Ethics | | | A- |
| 2013 | PY244 | Life Span Development | | | A |
| 2013 | PY331 | Biopsychology | | | A- |
| 2013 | PY417 | Psychology: Beginning & End of Life | | | A- |
| 2013 | PY435 | Field Experience in Psychology | | | A |
| 2013 | EN203 | Major Writers in American Literature | | | A- |
| 2014 | SC365 | Neighborhood & Community Development and Decay in America | | | A |
| 2014 | MU201 | Music Fundamentals | | | A |
| 2014 | WR230 | Art of Poetry and Fiction | | | A |
| 2014 | PL317 | Philosophical Perspectives: The Experience of Evil | | | A- |
|  | Temple University | | | |  |
| 2019 | PSY8510 | | Developmental Psychology | | A |
| 2019 | PSY8017 | | Professional Issues in Psychology Careers | | A |
| 2019 | PSY8011 | | Graduate Statistics I | | A- |
| 2020 | PSY8310 | | Neuromodulation of Learning and Memory | | A |
| 2020 | PSY8021 | | Graduate Statistics II | | A |
| 2020 | PSY8015 | | Teaching of Psychology | | A |
| 2020 | PSY8312 | | Cognitive Neuroscience | | A |
| 2020 | PSY8031 | | Survey in Multivariate Techniques | | A |
| 2021 | PSY8110 | | Seminar on Human Neuroimaging | | A |
| 2021 | PSY8033 | | Hierarchical Linear Modeling | | A |
| 2021 | PSY8430 | | Grant Writing | | A |
| 2021 | PSY8310 | | Social Neuroscience & Self-Control | | Audited |
| 2022 | NSCI8010 | | fMRI Methods & Analysis | | A |
|  |  | | |  | GPA: 3.97 |

**\*‘S’ indicates a satisfactory or passing grade in a pass/fail grading system.  
GRE Test Scores:** Verbal: 163, 93rd percentile; Quantitative: 159, 73rd percentile; Analytical Writing: 5.0, 93rd percentile.