

Finding My Passions and Purpose in Interdisciplinary Research

Chloe Thach

2024 LAURE Application

If I were to travel back to my first year at Miami in fall 2020, I would find myself with wild aspirations of becoming a researcher to help develop solutions for individuals with substance use disorders (SUDs) and wanting to learn every method possible to prepare me for that endeavor. In spring 2024, I am so proud to say that I have exceeded my expectations of who I wanted to be back then.

In my final research project at Miami, I am investigating the role of lead (Pb) in the development of SUDs using a geospatial analysis of epidemiological data of redlining, elevated blood Pb levels, and overdose incidences. This is a continuation of my previous studies under the research question, “Can Pb exposure cause the development of SUDs?” that used behavioral neuroscience methods with animal models, where we found Pb may increase risk for relapse-like behavior in male mice. This multi-faceted, interdisciplinary research project has given me a purpose in the movement towards health equity, in which I feel my role is to research *evidence for action* towards upstream solutions of healthy environments to whole communities.

I first had to propose my project with a literature review and Katie Gibson, Miami librarian and Western Program alumna, helped my class with Zotero citation software. This revolutionized how I wrote papers by saving time writing citations. Additionally, Zotero’s recommended sources function was more useful than searching on *Google Scholar* or using keywords in the search bar of library databases and helped to broaden and deepen my knowledge on my research question.

I wanted to address my research question using populational data, but I had no idea how I would conduct my study within a semester. However, as I was writing my literature review, I was recommended a geospatial analysis study from Zotero. It suddenly became clear to me that I could conduct a geospatial analysis using publicly available data within my timeframe. Additionally, while some clinical and pre-clinical studies addressed my research question, there was not yet a geospatial analysis that investigated variables of redlining, Pb exposure, and overdose incidences. This study could offer knowledge to public health intervention, environmental health, and epidemiology literature.

While I was excited about discovering these methods, I was suddenly faced with the reality that I have never used geospatial analysis software. Regardless, I was motivated to move forward because of the potential for real-world impact and I was determined to learn new skills that would add to my environmental health research experience. Because Katie Gibson had been helpful to my class in the fall, I knew I could reach out to a librarian to help me with this project.

I began communicating about my project to Miami librarians, Roger Justus and Kristen Adams, by asking where I could locate data. They helped me find data from government resources, where I was able to locate redlining, elevated blood lead levels, and incidences of drug overdoses data from Pittsburgh and Allegheny County in Pennsylvania. To learn how to use ArcGIS Pro, they also recommended that I begin with the free Esri online courses. After getting a baseline understanding of the program, Roger and I analyzed the Pittsburgh and Allegheny County data over various weekly meetings. This support from Roger to learn how to use ArcGIS Pro in a short amount of time has been detrimental for my project. His enthusiasm has been so infectious, and I am confident that I will continue using this mapping software in my future environmental health and health equity research.

As of March 11th, 2024, I have preliminary data from Pittsburgh and Allegheny County that suggest that communities affected by discriminatory redlining strategies by the Home Loan Corporation in the mid-twentieth century were more at risk for elevated blood lead levels, which may have led to higher numbers in drug overdose incidences in the twenty first century. By culminating this data with current literature and my previous studies, many Bradford-Hill criteria for plausible causality have been met, suggesting that disproportionate Pb exposure may be a factor in the development of SUDs.

Three and a half years ago, I would never have imagined the impact I may have on the environmental health of vulnerable communities, nor the impact undergraduate research has had on me. I am a behavioral neuroscience researcher through the Reward and Addictive Disorders Lab mentored by Dr. Anna Radke, and a social justice-oriented researcher through the Western Program for Individualized Studies mentored by Dr. Jaqueline Daugherty and Dr. Nik Money. I became president of the Student Organization for Undergraduate Research and Career Exploration advised by Martha Weber, and I was an undergraduate assistant for various classes to help mentor other students with their academic goals. I have changed my own philosophy from investigating health solutions for the individual to solutions for whole communities. I have traveled to Washington, D.C. to present my research at the Society for Neuroscience Conference; Ann Arbor, Michigan to conduct community health needs assessments; the Centers for Disease Control and Prevention in Atlanta, Georgia to present my best practice guide for reaching and working with underserved communities; and to Luxembourg and Geneva, Switzerland to research and present recommendations for climate change resilience in the lowlands of Ethiopia to the U.S. Department of State. I have developed a unique research question that integrates my

passions in environmental health, health equity, and behavioral neuroscience, and I have studied it using both animal models and human epidemiological data.

While I feel proud of my successes and motivated to continue in this fight towards evidence for action, I would never have made it this far without my mentors believing in my aspirations for research involvement my first year in undergrad and supporting every opportunity that came my way. Next fall, I plan to attend a master's program in environmental health, and I hope to continue building on the amazing foundation of research skills that I've developed here at Miami.