

# Research Project and Personal Development to date

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My research project set out to investigate the presence of heavy metals in menstrual products and their potential impacts on health, a topic that is both underexplored and deeply relevant to everyday wellbeing. The project was designed with a dual methodology: a large-scale survey to capture people's lived experiences of menstrual health, and laboratory experiments to test for the leaching of metals under simulated vaginal conditions. At the proposal stage, my aims were ambitious, with plans to test multiple endocrine-disrupting chemicals alongside a broad survey. In practice, the scope had to be refined as I navigated the realities of time, resources, and unforeseen setbacks. This essay reflects on that process, not just the outcomes, of the methodology and findings, but also the challenges faced, the lessons learned about leadership and personal growth, and the future directions the research might take. The focus is as much on how I grew as a researcher through this experience as it is on the scientific results themselves.

The structure of my project, which combined a large survey with laboratory experiments, profoundly shaped my experience of the research process. The survey component required me to engage sensitively with participants on a topic that can be deeply personal, teaching me how to design questions that are respectful, inclusive, and capable of capturing nuanced experiences. Through this, I became acutely aware of the diversity of menstrual health experiences and the ways in which individual circumstances, age, and product choice intersect to influence health outcomes. Engaging directly with participants also reinforced the ethical responsibility researchers have to treat data and personal experiences with care, fostering a sense of empathy and attentiveness that extended beyond technical skills.

In contrast, the laboratory work demanded a different set of abilities: careful attention to precision, rigorous contamination control, and systematic troubleshooting whenever protocols did not produce expected results. Balancing these two very different strands initially felt challenging, as each required distinct mindsets, approaches, and timelines. Over time, however, I came to appreciate the strength of combining human-centered data with experimental evidence, recognizing that together they provide a more complete

and meaningful understanding of the research question. This mixed-method approach pushed me to develop versatile skills, from statistical analysis to experimental planning, while also cultivating a sense of ethical responsibility, critical thinking, and empathy for the people whose experiences I was interpreting. Looking back, the methodology not only anchored the project in robust evidence but also shaped me into a researcher capable of interdisciplinary work, thoughtful problem-solving, and adapting responsibly when plans do not unfold perfectly.

My project found that tampons consistently leach measurable levels of lead under simulated vaginal conditions, with concentrations reaching up to approximately 6 parts per billion (ppb), while menstrual cups released much lower amounts. This indicates that product composition and material differences significantly influence the potential for heavy metal exposure. Although arsenic has been reported in prior studies, it could not be reliably quantified in my experiments due to high background contamination in the simulated vaginal fluid, highlighting both the technical challenges of detecting trace elements and the need for more refined methodologies in future research. The survey data supported these laboratory findings: tampon users reported the highest symptom burden and were over three times more likely to experience endocrine-related complaints compared to non-users, particularly among those with early menarche.

While the detected levels of lead were below drinking water limits, the unique physiology of the vaginal canal (its high vascularization, mucosal permeability, and prolonged product contact) suggests that even low concentrations may have biological relevance. This raises concerns about chronic exposure and subtle reproductive or endocrine effects, particularly for vulnerable populations. The stark differences between tampons and menstrual cups highlight gaps in material safety standards and regulatory oversight. From a public health perspective, these findings suggest the need for updated guidelines, stricter testing of menstrual products, and clearer consumer information about potential chemical exposure. Overall, the project underscores that seemingly low-level exposures can still carry meaningful health implications, reinforcing the urgency of continued research and evidence-based policy development in this area.

When I look back at my original proposal, it is clear that I was far too ambitious in what I thought I could achieve in the time available. I had planned to test a wide range of endocrine-disrupting chemicals across multiple menstrual products, while also running a large-scale survey. In reality, the laboratory component proved far more time-consuming and technically challenging than I had anticipated, and delays meant that I had to make a mid-project shift. Instead of attempting to force the original plan, I prioritised the survey and made it the central focus of my research, returning to the lab work only where possible. At first, I felt

disappointed by this change, as it seemed like I had “lost” part of my project. However, with reflection, I came to see the value in refining the scope: narrowing my focus allowed me to produce higher-quality results and to truly hone my skills in survey design, data analysis, and interpretation. This contrasted with the ambitious goals I had set in my PDP, which emphasised breadth and innovation. What I actually achieved was depth, clarity, and skill-building. The experience taught me to be realistic and flexible in my approach to research, and to view adjustments not as failures but as necessary redirections that strengthened both the project and my development as a researcher.

One of the most rewarding aspects of this project was the range of skills I developed along the way. On the empirical side, I learned how to design and analyse a survey in a statistically rigorous way, which gave me confidence in handling data and interpreting patterns that linked people’s lived experiences to broader health questions. In the laboratory, I gained valuable technical skills, from writing and following detailed protocols to understanding the importance of contamination control and reproducibility. I also grew as a writer, learning how to frame my findings clearly and persuasively in a scientific context. Beyond technical achievements, I take particular pride in the survey element of the project, which gave participants a chance to share their experiences of menstrual health. Amplifying these voices and situating them alongside the laboratory data felt meaningful, and it reminded me that research is ultimately about people as much as numbers or results.

Alongside these successes, I faced significant challenges. The laboratory work was disrupted by logistical issues, such as a critical acidification error and repeated communication breakdowns with busy lab staff, which slowed progress and demanded persistence on my part. I also struggled with confidence, particularly in standing up for myself when I needed lab resources or support, and I sometimes felt overshadowed in those environments. Time pressures compounded these difficulties, especially as I realised my original project scope had been unrealistic and needed scaling back. Despite these setbacks, I learned to be resilient and determined, often having to “fight” for my experiments to be processed. In hindsight, the obstacles became opportunities to grow: they forced me to adapt, problem-solve, and persist in ways that strengthened my independence as a researcher. What initially felt like failures became the foundation of my professional development.

Throughout this project, I gained significant insights into my own leadership style and areas for growth. One of my key strengths emerged as resilience and adaptability: when setbacks arose, I was able to recalibrate and maintain momentum, learning to approach challenges with a problem-solving mindset rather than frustration. However, I also recognised a tendency toward self-criticism and perfectionism, which occasionally slowed decision-making and created unnecessary pressure. Navigating the leadership aspects of the project required advocating for my own work and effectively managing limited resources, which highlighted the importance of clear, consistent communication. Coordinating with lab staff and collaborators further reinforced the value of persistence, diplomacy, and the ability to adapt expectations in response to changing circumstances.

This experience reshaped my understanding of leadership more broadly. I came to appreciate that leadership is less about exerting control and more about demonstrating flexibility, determination, and the capacity to support others while maintaining focus on objectives. Observing a variety of leadership styles, both effective and less helpful, provided valuable contrast and allowed me to identify constructive approaches I wish to emulate, such as encouraging autonomy and fostering a collaborative environment.

Personally, the project prompted growth in how I perceive imperfection. Rather than viewing mistakes as failures, I began to see them as integral to progress, opportunities for learning, and moments to strengthen resilience. This shift not only improved my effectiveness as a leader within the project but also nurtured a more balanced, self-compassionate approach to challenges. Overall, the combination of practical experience, reflection on strengths and weaknesses, and observation of different leadership behaviors has deepened my self-awareness, equipping me with skills and perspectives that will guide my future projects and professional development.

Moving forward, I plan to expand the laboratory aspect of this research on a larger scale, incorporating a greater variety of menstrual products and additional variables to gain a more comprehensive understanding of potential chemical exposures. Alongside this, I am keen to continue using an interdisciplinary approach that combines laboratory analysis with survey-based data, as this methodology provides a richer, more nuanced perspective on the issue. Reflecting on the project, I now have a clearer sense of the significance of this research, both scientifically and socially, which has strengthened my motivation to pursue it further. This experience has highlighted the value of combining experimental work with real-world data to generate meaningful insights, and I am eager to build on the skills and knowledge gained to contribute to ongoing investigations in this area. Overall, the project has not only refined my technical and analytical abilities but has also reinforced my commitment to research that bridges scientific rigor with practical relevance.

This project has been pivotal in shaping my growth as a researcher, providing deep insights into both my strengths and areas for development. I discovered that I am driven, resilient, and resourceful, capable of navigating challenges and finding solutions when unexpected obstacles arise. At the same time, I recognised that I still need to improve my organisation and focus, particularly when juggling multiple tasks or complex datasets. Experiencing the inevitable roadblocks inherent to research reinforced the value of perseverance, patience, and adaptability, teaching me that progress often comes through persistence rather than immediate success.

On a personal and professional level, this project transformed my confidence in managing ambitious, multifaceted investigations. I have learned to approach research with greater strategic thinking, understanding the importance of defining realistic scope and planning carefully to ensure high-quality outcomes. Beyond technical skills, the project has shaped my identity as a researcher who values both scientific rigour and the human experience, appreciating how research can meaningfully impact people's lives. Overall, this journey has strengthened my self-knowledge, honed my problem-solving abilities, and instilled a mindset that balances

ambition with reflection, resilience, and thoughtful planning—a foundation I will carry into future research endeavours.

This project has been a valuable journey of both scientific inquiry and personal growth. Through a combination of laboratory analysis and survey-based research, I developed a deeper understanding of methodology, honed my data-handling skills, and gained insight into the challenges inherent in experimental work, including unexpected technical difficulties and the need to adapt plans when setbacks occurred. The findings, while more focused than originally intended, provided meaningful insights and highlighted the importance of perseverance and resilience in research.

Leadership played a central role throughout the project, teaching me the value of clear communication, adaptability, and strategic problem-solving, while also revealing areas for self-improvement, such as balancing ambition with realistic planning. Overall, the experience strengthened my confidence and resourcefulness as a researcher, fostering both professional skills and personal growth.

Although the project diverged from its original plan, this redirection ultimately proved successful in shaping both the research outcomes and my development as a researcher. Moving forward, I am motivated to continue this work, building on the skills, insights, and determination cultivated throughout the project, and contributing to research that combines scientific rigour with meaningful real-world impact.