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Lang Prize Submission

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<div align="center">Lang Prize Reflective Essay</div>

I decided to write "Comparing Lifestyle-Only Interventions with Combined Medicinal and Behavioral Approaches in Managing Polycystic Ovarian Syndrome (PCOS)" during the Fall Quarter of 2024 while taking UWP 104FV: Writing in the Health Professions with Dr. Brendan Johnston. Initially, I was skeptical of having to take yet another writing class on top of my demanding science course load. As the quarter progressed, however, UWP 104FV became the most interesting and professionally relevant course I've taken at UC Davis. Most of all, I appreciated the autonomy and flexibility Dr. Johnston gave me in choosing the topic and scope of my scientific literature review. As a Neurobiology, Physiology, and Behavior (NPB) student, I came into this course with an interest in reproductive endocrinology and women's health. That left me with choosing a specific reproductive endocrine disorder to research. My own challenges with hormonal health and three friends who have received formal diagnoses influenced me to choose Polycystic Ovarian Syndrome (PCOS), specifically researching the efficacy of current prescribed treatment methods for the disorder.

Under the guidance of Dr. Johnston, I shifted my initial research to a more qualitative scale by interviewing my friends who were comfortable with sharing their experiences managing PCOS symptoms. I left these interviews with insight on three common treatment methods: healthy eating, regular exercise, and hormonal birth control. Immediately, I saw that I could group these terms together by comparing lifestyle (healthy diet and regular exercise) with medicinal interventions (hormonal birth control).

After narrowing down my topic, I began my research using the library databases. Prior to starting, I had a vague idea of how to use boolean operators from high school but had never put them to use. Not only that, the sheer amount of databases to which I had access was quite overwhelming. I didn't know which ones to use or how to determine if the articles I found were appropriate for the scope of my research. At the time, I was working on my research proposal and was unsure how to describe my research plan and projected sources. There were all these buzzwords like "randomized control trial," "meta analysis," "qualitative literature review," "blind experiment," "double-blind experiment," and so much more.

Thankfully, I had the opportunity to attend a presentation given by Erik Fausak, the Health Sciences librarian, who was able to educate me about how to strategically use the library databases. He introduced me to SCOPUS, which proved to be an excellent tool during my research process. I used SCOPUS to cross-reference an article I found from another database to see how many times it'd been cited in academic literature, establishing its credibility. He then explained how to filter my search results to reduce the amount of irrelevant articles I would need to sift through. For instance, some of the boolean operators I was using were "PCOS" AND "lifestyle interventions," "PCOS" AND "hormonal birth control", or some variation of those two. Additionally, since the purpose of my literature review is to write about current treatment methods, he recommended I restrict the time frame to about ten years old. I wasn't too strict with this number, however, since the diagnostic criteria and treatment methods for PCOS still closely follow those established in the early 2000s.

Then, he suggested I further narrow my search by restricting the type of research article, whether that be a literature review, meta analysis, or randomized control trial. He explained that one isn't necessarily worse than the other, rather they each serve a unique purpose in the writing

process. I found qualitative literature reviews to be more appropriate to establish background information, since they focused more on general facts rather than specific numbers. I used both randomized control trials (RCTs) and meta analyses for my results and discussion section, but prioritized RCTs since they are written and published by the researchers themselves and usually discuss the results of one experiment. Meta analyses, on the other hand, synthesize many research studies together to create a conclusion which can be misleading at times.

After applying the filters, the final step in the process was to skim the abstract and methods sections of each study to see if the information would support my research question. In the methods section, I would look at sample size, length of experiment, and randomization of the participants. When it came to RCTs, larger sample sizes, longer experiment durations, and double-blind experiment setups proved to be most effective in participant retention and statistically significant results. On the other hand, the abstract section proved to be immensely helpful in its own way. Contrary to popular belief, abstracts are not just summaries, they have a set of boolean operators associated with them to help individuals like myself be more precise and efficient when looking for relevant literature. Once I found my first article, Erik advised that I use some of these new boolean operators to continue my research. I found this strategy to be unbelievably effective, since it opened up a whole new realm of treatment methods for PCOS that I hadn't considered before. For instance, the article I found on hormonal birth control as a treatment method for PCOS had "AMH (Anti-Mullerian hormone) levels" as one of its boolean operators. Out of curiosity, I decided to plug "PCOS" AND "AMH levels" AND "treatment" into the search bar. I was met with a plethora of search results talking about metformin's ability to show clinically significant reductions in AMH levels. Never would I have thought that

metformin, a drug traditionally used to treat Type II diabetes, could be used in PCOS management.

At this point, I knew I had to shift the focus of my research question from a qualitative, focusing on patient experience with treatments, to quantitative, focusing on efficacy of treatment outcomes. Using the PICO(T) formula recommended by Dr. Johnston, I was able to identify the population, intervention, comparison, outcome, and optional time frame to guide my research. I wanted to focus on women under 25, comparing whether lifestyle interventions (calorie deficit and regular exercise), medicinal interventions (metformin and hormonal birth control), or a combination of both were more effective in treating PCOS symptoms. As I started to look for research on PubMed and EMBASE, however, I realized I had severely overestimated the amount of high quality research available for the scope of my question.

After conducting my preliminary assessment of each relevant study, I noticed a trend in the population of interest; most studies were focusing on obese women ages 18-45, so I fixed my problem by tweaking the scope of my population. This is where my research question truly started to evolve. Further research on this population revealed how the comorbidities of PCOS and obesity are intertwined, impacting women's psychological, reproductive, and metabolic health. This information helped me expand the scope of my intervention, adding in cognitive behavior therapy (CBT) to address psychological issues like anxiety and depression. This change also allowed me to broaden my comparison, questioning whether a combination of three treatment methods to address each facet of PCOS individually is more effective than one alone.

Now that I was able to appropriately define my research question, I narrowed down my findings using a research matrix. The research matrix was the most helpful pre-writing assignment I completed in my class, since I was able to clearly map out aspects of each paper to

compare in one place. Some of these aspects include the paper's strengths, limitations, primary results, intersections to my central research question, intersections to other studies, methods, population, study design, and literature type. I was able to incorporate many parts of my research matrix directly into my literature review, especially the information about each source's intersections to other studies. I found this section to be the most helpful since the main purpose of my literature review is to synthesize the findings of these studies to answer my research question. For example, I found two RCTs evaluating the effectiveness of combined CBT and lifestyle interventions with each treatment method alone. The only difference between the two was the time frame, with one being a year long and the other three months. Despite this variation, I noticed the findings of both studies were exactly the same. I used this similarity to my advantage, intertwining the results of both studies to create stronger support for the effectiveness of combined treatments for PCOS. As my writing progressed, I found myself adding and removing sources from my original research matrix, but evaluating each new source with the same technique.

This left me with ten relevant sources, but the screening process wasn't over yet. I needed to perform a risk of bias assessment, which was necessary to determine the validity of each study's findings. After finding formal critical appraisal tools to be overwhelming, I decided to develop my own bias assessment tool, which is outlined in Appendix A of my literature review. This tool incorporates portions of the Joanna Briggs Institute's method for analyzing RCTs, excluding the sections on statistical analysis and RCT design due to my limited expertise in these areas. Instead, I focused on the randomization and blinding of participants and researchers involved in each study. For instance, many of the studies I reviewed did not allow those delivering the treatment to be blinded to treatment assignment. As healthcare professionals, they

must be informed about the study and sign consent forms which allow them to share participants' health information with researchers. Although unavoidable, this lack of blinding could unconsciously skew the findings and lead to subjective interpretation of the data. After analyzing each study, I realized only six met my criteria. The other four did not have a clear explanation of their treatment groups and randomization process, so they were excluded. While I did not become an expert on critical appraisal, I learned how a study's design can impact its measured outcomes. This showed me how dynamic the research and writing process can be; you can think that you found the perfect sources, only to discover they are no longer a great fit.

Growing up in a digital world, I have had to make a conscious effort to fact check information when consuming media online. The library resources helped me reignite this skill from an academic lens, learning to comprehensively evaluate sources to find those that are credible and applicable to my scope of research. As someone who wants to pursue a career in medicine, I must be able to critically assess scientific research to inform patient care. My learning doesn't stop after medical school and residency, I am expected to stay up to date with the latest tools and treatment methods for the rest of my career.

Along these lines, the digital world has created many tools to supplement my learning potential, one of them being generative AI. Under the guidance of Dr. Johnston, I used AI during the revision part of my writing process. As a seasoned writer, I have always struggled with using too many filler words and restating things that have already been said. Since I had never written a scientific paper before, I prompted ChatGPT with questions about whether each section was contextually appropriate. My strategy involved copy and pasting the rubric, adding the portion I wrote, and asking specific questions. For example, in the first draft of my results section I included information about each study's target population and inclusion criteria before stating its

findings. I asked ChatGPT whether this is necessary, and it responded saying that restating the background information of each study is redundant since the information is already found in my introduction. I agreed with its suggestion, and consolidated my results section by removing irrelevant information. My AI usage is reflected in the appendix section of my literature review, which emphasizes the importance of transparent AI use, especially in the field of science. While AI can never replicate the quality and accuracy of human writing, it served as a great tool to polish small inconsistencies and reservations I had about parts of my literature review.

Overall, while my experience researching and writing about PCOS was personally and professionally rewarding, it was also unsettling. The difficulties I faced finding quality research studies revealed to me just how underfunded and under researched the field of women's health has become. The bulk of the research I found about PCOS is centered around obese women, but what about women with a healthy BMI? Not only that, the research exclusively focuses on women ages 18-45. What about people who are younger or older? How are physicians expected to inform clinical care when research for their patient's demographic is severely lacking? Above all, I hope that my literature review can serve as a call to action. We live in a world surrounded by state of the art science and technology, yet we have barely scratched the surface on disorders that disproportionately affect women. (No AI tools/technologies were used in the writing of this essay).