

## **Board 134: Methods for Conducting a Scoping Literature Review on Engineering Graduate Student Mental Health (Work in Progress)**

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# Methods for Conducting a Scoping Literature Review on Engineering Graduate Student Mental Health (Work in Progress)

## Introduction

In this paper, we detail the methods used to conduct a scoping literature review concerning the current state of literature surrounding U.S. engineering graduate students' mental health.

### *Graduate Student Mental Health*

Existing literature surrounding mental health in academia has emphasized the importance of context and how it plays a critical role in understanding the disparities between findings for different groups. One study showed that for master's and doctoral students (N=15,852), over 26% met the criteria for at least one mental health problem (e.g., depression, anxiety, suicidal ideation, or nonsuicidal self-injury) with roughly 40% of those with an apparent mental health problem receiving treatment in the past year [1]. Although this study was able to draw out differences between graduate and undergraduate students, it was limited in the analysis as it was focused on comparing the two groups. Another recent publication regarding doctoral students' well-being presented a systematic literature review detailing findings from 17 recent publications from four databases. However, the broad review scope and search terms used makes this work hard to be transferable for a specific discipline [2].

These findings demonstrate that an ideal study of graduate student mental health would be designed to focus specifically on a graduate population within a specific discipline. Multiple studies have shown a relationship between one's academic discipline and one's reported mental health; not only are there differing norms per discipline, there are differing cultures in each field that can influence one's attitudes towards mental health, such as the expectations towards collaborative work or help seeking behavior [1, 3-4]. More specifically, studies have reported that being enrolled as an engineering or science student significantly decreases one's likelihood to seek help for mental health problems when compared to other disciplines (e.g. arts, humanities) [1, 3]. Although the climate concerning mental health and help seeking behavior may contribute, there is a paucity of literature that specifically addresses the reasons as to why this may be. When looking at the academic experiences and social demands faced, it becomes apparent that graduate students are influenced by pressures that differ from the undergraduate experience, such as research, teaching, publishing requirements, finding employment, and unclear advisor expectations [3]. Conducting a scoping literature review specific to engineering graduate students' mental health will provide a clear snapshot of the current scholarly discourse and identify areas that have yet to be a point of focus.

### *Scoping Literature Reviews*

Scoping literature reviews (ScLRs) are conducted to address broader research questions with the goal of understanding the extent of research that has been conducted. In contrast to a systematic literature review, in which the research question(s) is narrow and specific, the objective in a scoping review is to summarize and synthesize the existing literature without using formal quality assessment in the inclusion or exclusion criteria [5-8]. That is, the perceived quality of the literature has no weight on its appearance in a final scoping review although both types have inclusion and exclusion criteria. ScLRs assist to identify gaps in literature as well as direct researchers towards specific questions for a systematic literature review by rapidly mapping the key concepts, sources,

and existing evidence [5-6]. Most ScLRs do not have formal appraisal mechanisms (ratings used to assign merit to determine inclusion or exclusion) for the literature being reported in the ScLR process.

The ScLR was broken into five stages: (1) identify the research questions, (2) identify relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing and reporting results, closely following the methods outlined by Arksey and O'Malley [6]. These are iterative stages and expanded on in Table 1 below.

Table 1  
*The Five Stages of a Scoping Literature Review*

<b>Stage</b>	<b>Objective</b>	<b>Outcomes</b>
1: Identify Research Questions	Determine scope of project and focus for search.	Inclusion and Exclusion Criteria
2: Identify Relevant Studies	Determine relevant sources of literature.	References for Study
3: Study Selection	Define screening process.	Eligible References
4: Charting the Data	Coding the literature and record vital information.	Literature Data for Analysis
5: Summarize & Report Results	Condense & organize all information collected into a report.	Identify current literature trends & potential gaps.

During the initial phase of the literature review it is crucial to be critically reflective of the process, re-visiting prior stages to ensure that the final review meets the desired scope of the project.

## **Methodology**

### *Study Design*

This ScLR closely follows the stages outlined above, focusing on engineering graduate student mental health. It is also important to note that during the first and second stages a librarian skilled in conducting literature reviews was consulted to provide expert guidance and resources [8]. The sections below detail the first three stages of the ScLR as these have been the main focus thus far.

### *Stage 1: Identify the Research Questions*

As identified above, there appears to be an overall deficiency in the literature surrounding graduate student mental health in general, and even more so when one looks specifically at the engineering discipline. It is important to identify if and where this deficiency exists before further studying graduate student mental health. Therefore, the aim of this ScLR is to determine the current state of scholarly discourse surrounding engineering graduate students' mental health, forming the following three research questions:

- (1) What are the major trends and findings present in literature about engineering graduate students' mental health?
- (2) What areas of mental health for engineering graduate students are being studied?
- (3) What are the current gaps in the literature about engineering graduate students' mental health?

There are three central inclusion criteria that come from the scope of the proposed research question: (1) the literature *must discuss graduate students*, (2) these graduate students *must be in engineering disciplines*, and (3) the literature *must emphasize mental health of these students*. For the purpose of this ScLR, mental health is defined as anything related to a person's emotional or psychological wellbeing. This definition is an expansion of the World Health Organization's (WHO) definition of mental health "as a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community," [9]. In addition to these three central inclusion criteria, there are three additional strong inclusion factors: the publication must be a peer-reviewed journal or conference paper, the publication must be in English (restricted by reviewer's language base), and the publication must focus on students studying in the United States. Finally, any study that focused on a population in a clinical field or medical health related occupation (i.e., nursing, medical doctor, veterinarian) was excluded.

### *Stage 2: Identify Relevant Studies*

The starting data set included publications found using queries designed around the three central inclusion criteria from relevant databases. Five databases were queried to find relevant literature: EBSCO: CINAHL, EBSCO: PsychInfo, ProQuest: ERIC, PsychInfo, and Scopus. This resulted in 5,120 publications. After each iteration of searches were conducted, the publication references were imported into DistillerSR, an online software tool designed for systematic literature reviews. The software was able to identify 431 unique duplications, bringing the total number of publications to 4,689.

### *Stage 3: Study Selection*

There are three main screening processes for study selection: title, abstract, and full-text. Two reviewers were used for the title and abstract screening process, while a third reviewer was added at the full-text screening stage to help limit bias in the screening process [8]. Each process utilized the inclusion and exclusion criteria above to some degree. Table 2 on the following page shows the questions asked at each stage of the screening process. Beginning with a title screening, all titles were reviewed against the question "Is the title relevant?" Reviewers interpreted this question to mean that the title directly suggests that at least two of the three central inclusion criteria were met. Any responses of yes or not sure were included to the next round of screening whereas those deemed irrelevant were excluded. In the abstract review phase, a total of four questions were asked. The full-text review includes the four questions asked in the abstract screening with the addition of four new questions, totaling to eight questions in the screening process. Although this stage is intended for deciding eligible literature for the study, some of the information collected in this stage will help to inform the data collection in *Stage 4*. At any stage in the screening process if a document clearly violates the inclusion criteria it is excluded, whereas those that are unclear will automatically progress to the next screening process.

The first round of title screening has been completed with 1,832 documents moving on to the second abstract screening stage. During the review process, roughly one-fifth of the titles needed to be re-screened with both reviewers present as they disagreed on whether to include the title. As the reviewers decided to divide the abstracts, the first 10 abstracts were used to train and assess the reviewers' agreeance on inclusion or exclusion of the abstracts. Following this, two rounds of screening 20 titles independently and then comparing were needed to reach an agreeance of 80%.

The reviewers then split the remaining abstracts. 624 documents moved onto the third stage of full text screening that is currently in progress.

Table 2  
*Screening Questions for Literature Inclusion/Exclusion*

<b>Step</b>	<b>Screening Question(s)</b>	<b>Response For Inclusion</b>
Title	Is the title relevant?	Yes, Not Sure
Abstract and Full-Text	Is this study focused on U.S. populations?	Yes, Not Sure
	Are graduate students a major focus of this study?	Yes, Not Sure
	Are the students in an Engineering discipline/field of study?	Yes, Not Sure
	Does the abstract discuss mental health?	Yes, Not Sure
Full-Text Only	What mental health keyword terms are used?	Any non-chronic ailment.
	What degree programs are the students a part of?	Masters, Doctoral, Graduate
	What disciplines are explicitly stated?	Engineering
	Where was this article published?	Any journal publication.

### **Conclusions and Future Work**

Although they have been touched on through other aspects of this project, *Stage 4: Charting the Data* and *Stage 5: Collating, Summarizing and Reporting the Results* are still in progress. The current focus is the completion of *Stage 3* before critically reflecting on the screening process. This will allow for more refinement and solidarity and therefore a better-defined research scope and review process.

The research team will critically reflect once more on the results from the full-text screening. This will enable a full-text coding guide to be developed so that the information collected from each eligible publication is uniform. Although some of the information that will be presented in the full-text coding guide is evident (e.g., title, author, journal of publication, focus population), there needs to be lengthier discussions surrounding potential study designs, anticipated results, and how to best categorize and present results.

### **Limitations**

As with the nature of scoping literature reviews, the entire process is subjective in nature. Secondly, the breadth of the research topic makes resources a limitation. The scope of the search and the time to conduct the study limits the search criteria, the number of databases searched, the inclusion and exclusion criteria, and ultimately the number of studies included in the review. Thirdly, the search was not restricted to any timeframe but was limited to United States graduate students in engineering. This may have resulted in a loss of valuable information from other countries and disciplines. Lastly, the keywords used, although discussed among multiple individuals, may have simply not been exhaustive enough. Some terms were elected to not be included due to redundancy or a surge in irrelevant literature which may in turn have resulted in a loss of relevant sources.

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