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Work in Progress: Assessing the Need for Mental Health Curricula for Civil, Architecture, and Construction Engineering

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WIP: Assessing the Need for Mental Health Curricula for Civil, Architecture, and Construction Engineering: A Preliminary Study

Abstract

The mental health crisis among college students in the US has been steadily growing. In particular, engineering students are found to be more susceptible to mental health issues such as anxiety and depression when compared to the general population. Graduating college students may also experience job-seeking anxiety before they begin their career. In addition, engineering students are often susceptible to psychological issues due to their lack of help-seeking attitudes in comparison to their peers. Given the challenging conditions and high prevalence of mental disorders and suicide rates in the construction industry, it is crucial to promote mental health awareness among students studying Civil, Architecture, and Construction Engineering fields. Moreover, enhancing their abilities to support themselves, their peers, and future coworkers can contribute to the development of a more productive and mentally healthy future engineering workforce, with improved communication skills. The purpose of this study is to assess stress levels and stressors of Civil, Architecture, and Construction Engineering students as well as identify key mental health skills they need to learn to cope with job-seeking and future workplace challenges. To achieve this, a questionnaire survey will be conducted to evaluate the factors and challenges that impact the mental health of senior engineering students, and the concerns and stressors that entry-level and inexperienced engineers may face in the workplace. Demographic information will be collected initially, followed by two sets of questions to assess the participants' stress levels related to job-seeking and future career challenges. These questions will be categorized as personal and work-related stressors. Furthermore, this study aims to gather opinions on the necessary skills that should be integrated into a mental health educational program. This will provide insights into the required educational content for future mental health curricula targeted towards engineering students.

Introduction

According to the recent survey by American College Health Association (ACHA) among 26,000 undergraduate students in the US, nearly 40% reported experiencing depression and anxiety [1]. Another research project, which examined mental health among more than 350,000 students in the US from 2013 to 2021, reported that in 2020-2021, more than 60% of students from various campuses reported experiencing at least one mental health issue [2]. Research has shown that compared to other college students, engineering students are more likely to experience mental health problems such as anxiety and depression [3], [4]. In engineering education, there are correlations between psychological disorders among students and retention as well as academic success [3]. In addition, a study has suggested that compared to their peers, engineering students are more susceptible to experiencing stigma [5]. A study identified potential engineering-related stressors that may affect a student’s help-seeking behavior [6]. Stress is caused by various factors, including unsupportive environment, heavy workload and time restriction, lower priority of mental health, “suck it up” attitudes towards mental health, and public shame [6].

There is a growing demand for a greater emphasis on mental health within engineering educational curricula. A study has suggested that improving student mental health will require taking important steps, such as increasing access to counseling services and promoting awareness and training among students, faculty, advisors, and administrators [7]. However, simply offering psychological services to students in other academic disciplines may not be sufficient because of the barriers to seeking help [8]. In addition, it is also recommended that a culture of wellness be fostered in engineering programs by integrating wellness activities into the curriculum [9]. Previous research projects have mainly focused on the impact of students' disciplines, gender, and the nature of engineering education on mental health issues among engineering students [4], [10], [11]. In contrast, this study aims to investigate the stressors experienced by Civil, Architecture, and Construction Engineering students who are approaching graduation and going through the job-seeking process, as well as the initial stages of their careers. The objective of the study is to address a gap in the current literature by examining the causes of stress in these contexts and using the findings to assess the requirement for future mental health and well-being curricula in engineering education.

Literature Review

The second major cause of death among college-aged individuals is suicide [12]. At the same time, it has been revealed that the rate of suicide in male-dominated industries, like the construction industry, is substantially higher than in other industries [13]. The work environment in these industries could potentially impact the mental well-being of young engineers who are entering the workplace. Previous studies employed surveys to identify characteristics influencing college students' mental health [6]. Academic characteristics such as year of study, workload, and program were investigated, and it was discovered that first-year and fourth-year undergraduate engineering students face more mental health difficulties [10]. Engineering students in their first year typically face a heavy workload and a considerable number of homework assignments [10]. Similarly, fourth-year students may encounter difficulties with complex and lengthy course projects, which can lead to feelings of being overwhelmed [10]. In contrast, second-year students tended to experience less stress as they reported spending the lowest number of hours on homework [10]. Additionally, the reduced focus on the fear of failure, after successfully passing their first year, further contributed to a reduction in stress and an improvement in second-year engineering students’ confidence levels [10]. Minority groups, such as female engineering students, have been demonstrated to be three times more susceptible to anxiety and depression than their non-engineering peers [10], [14]. According to a study, gender bias in male-dominated fields such as Civil and Mechanical Engineering, where over 90% of the class population and the majority of professors are male, leads to added anxiety and feelings of isolation for female students [15]. They face pressure to demonstrate their abilities to professors and industry leaders [15]. Apart from factors such as gender, race, and being a first-generation student, identifying as having a disability is also associated with specific stressors and obstacles in the context of higher education [16]. Research has shown that among engineering students, mental health conditions are highly correlated with physical disabilities, rather than learning disabilities [16]. In terms of program and according to a study, the field of Electrical Engineering was found to have a negative correlation with mental health issues because of its highly competitive environment when compared to other majors [10]. Another study indicated that Computer Engineering students are among the most susceptible to experiencing mental health

disorders, followed by Electrical Engineering students, as determined by scores on the Kessler scale [4]. It is suggested that engineering students face work-related stressors such as prolonged computer usage, number of hours of homework, anxieties regarding academic achievement, competition [17] and future prospects [18]. The results of a recent study revealed that high academic rigor and exams were identified as the most common sources of stress among engineering students [7]. On the other hand, personal stressors such as living away from home, peer pressure, health and financial worries should be taken into account [19]. The research discovered that engineering students experiencing mental health problems are less likely to seek support for their mental health issues [20].

Stress and anxiety are prevalent among engineers [21]. This is a result of the nature of engineering, characterized by its strictness, robustness, and a demanding work ethic [21]. Work pressure can have negative impacts on both physical and mental health of individuals [22]. Similar to engineering students, individuals in male-dominated industries also face challenges associated with mental health stigma. This can worsen existing mental health issues and lead to new problems such as reduced concentration and lower productivity [23]. Individuals in the engineering industry encounter various challenges, including being away from family while working at a distant location, dealing with stigma when seeking help, and the belief that exhibiting strength is more valued than acknowledging vulnerability [24]. Research has shown that young workers in the general population are experiencing mental health problems due to several work-related stressors [25]. A recent report also indicated that among 904 engineers in the UK, 80% have reported mental health problems [26]. It has also been suggested that 25% of this population have reported having thoughts of self-harm or suicide, and only 31% of these engineers feel sense of belonging in their work environment [26]. Fields like construction pose substantial safety risks that can not only create an unpleasant work environment but also have adverse effects on the physical and mental health of employees. While engineers may face fewer risks than front-line workers, working in the construction industry can still affect the mental health of young engineers who supervise workers. This industry has higher rates of opioid-related overdose and suicide than the general population [13]. Previous research projects have focused on the mental health of construction workers, neglecting that of young workers [27]. Nevertheless, it is equally important to assess the mental health of young engineers.

Consequently, it is imperative to provide students with supportive programs or curricula even if they do not explicitly request them. Research has shown that incorporating hands-on learning experiences can enhance the effectiveness of mental health curricula for college students [28]. According to the study, greater emphasis should be placed on experiential teaching methods, such as situational experience, role-playing, and case-method teaching, to enrich the learning process [28].

Methodology

The most important phase in curriculum development is needs assessment [29]. A needs assessment is important as it helps to elucidate priorities and to develop action planning [30]. While frequently overlooked, needs assessment is the procedures of evaluating the educational requirements of individuals or groups and matching their needs with the curricula or training [31].This study aims to employ a comprehensive questionnaire survey that includes both open-ended and close-ended questions to identify various types of stressors experienced by students in

Civil, Architecture, and Construction Engineering. The questionnaire can be found in the Appendix. The initial section of the survey is devoted to collecting demographic information, including age, gender, ethnicity, current job/student status, field of study, and whether respondents are first-generation college students. This information will be utilized to facilitate the analysis and comprehensive understanding of the obtained data. A previous study highlighted the importance of considering disability as a factor which could affect student's mental health [9]. A recent study also suggested the urgent need for mental health resources for engineering students who have physical disabilities, as these individuals are at a higher risk of experiencing psychological distress [16]. Therefore, the questionnaire for this study also includes a question for participants to self-identify as having a disability.

The questions are classified into two groups based on two commonly studied factors in field of mental health: "Personal/Family Stressors" and "Workplace Stressors" [32], [33]. The study utilizes the reliable Perceived Stress Scale (PSS4) as its designated evaluation, which is an authentic instrument for assessing stress. [34]. The PSS4 measures perceived stress by taking into account an individual's feelings and thoughts over the course of the previous month. While the PSS4 survey evaluates general feelings that may cause stress in individuals, the stress assessment questions used in this study are tailored to align with its primary objective. Although the PSS4 questionnaire aims to identify general stressors, this study has created two separate sets of questions to evaluate the participants' worries and stress levels related to job searching and their future career. Each group of questions, contains ten questions. The PSS4 provides a range of response options called Cohen's original scale [34], including 0: Never; 1: Almost Never; 2: Sometimes; 3: Fairly Often; and 4: Very Often with a higher score indicating a greater level of stress experienced by the participant. Then, the students are queried about the necessary abilities they believe they need to confront and manage mental health obstacles in both their personal and professional lives. A 5-point Likert scale is being utilized to avoid neutral viewpoints. Four pre-selected skills for enhancing mental wellness, including "Stress management skills" [35], "Decision making skills" [36], "Effective communication skills"[37], and "Skills for reducing stigma"[38] are included in the survey. In addition, one open-ended question is also included to inquire about any other skills that the students believe are necessary for confronting and managing mental health problems. At last, the students are asked to provide their viewpoints on the importance of incorporating engineering mental health curricula into their undergraduate studies. The questionnaire is currently undergoing the Institutional Review Board (IRB) process and will be distributed among senior students in the Department of Civil, Architecture, and Construction Engineering at the University of Alabama. Students will receive an email containing a link and QR-code to access the survey questionnaire created in Qualtrics.

Data Analysis

Once the data has been gathered, the study will analyze the information obtained from two main perspectives:

1. Firstly, the study will begin by summarizing the results of participants' responses to stress-related questions, using the PSS4 measurement, in order to evaluate their stress levels. This analysis will help determine whether job-seeking challenges and future career concerns can be considered as potential risk factors for mental health among the selected

group. According to the PSS4, which consists of 10 questions, a total score between 0 and 13 will be classified as a low level of stress, while a score ranging from 14 to 26 will be considered a moderate level of stress, and a score between 27 and 40 will be classified as a high level of perceived stress [33].

2. Secondly, this study will use regression analysis to explore potential relationships between stressors and demographic data.

Ultimately, the data obtained from the last section of the survey will aid in assessing both the participants' level of interest and the perceived significance of incorporating mental health education into engineering curricula.

Discussion and Future Study

This study serves as a starting point for evaluating the requirements for creating a mental health curriculum specifically tailored for senior engineering students or future engineers. Curriculum creation is a sequential procedure that covers various phases, including design, implementation, and assessment [39]. The purpose of this study is to draw attention to the significance of incorporating mental health education into curricula for engineering students, particularly at a time when they are hesitant to seek assistance for their mental health concerns both in their academic and professional settings. By examining and addressing these issues through a well-designed curriculum, it becomes possible to provide solutions and support for these students.

It is worth mentioning that the studies on anxiety related to job preparation are insufficient, and this is not limited to engineering students [35]. Thus, developing interventions and offering assistance to foster constructive job preparation behaviors and decrease job-seeking anxiety is imperative. At the same time, it is equally important to equip future engineers with the necessary skills and knowledge to effectively handle their work environment and manage potential stressors that may impact their mental well-being. Certain industries such as construction, have a high rate of suicide and drug-related mortality compared to general population [40]. This highlights the fact that working in such environments can have detrimental effects on employees, regardless of their job level or position. In addition, mental health education should be implemented to provide future engineers with better communication and de-stigmatization skills. This will enable them to effectively manage and supervise employees and workers. However, the availability of resources for mental health support and education could be a challenge for implementing a comprehensive mental health curriculum, especially in the engineering field. There are several challenges that may hinder the development and delivery of effective mental health education for students in Civil, Architecture, and Construction Engineering programs. These challenges include funding limitations, staffing, and curriculum scheduling constraints.

The present study highlights the need for continued investigation into the development of mental health curricula for engineering students. Although this study emphasizes the importance of including mental health curricula in Civil, Architecture, and Construction Engineering programs, future research could expand its scope to involve students from diverse backgrounds and majors, such as Electrical Engineering and Computer Engineering. Considering the

importance of conducting a needs assessment in the design of educational curricula, it is essential to employ comprehensive approaches to collect information from groups beyond students. To gain a more comprehensive understanding of mental health issues among senior engineering students, it may be valuable to solicit input from university faculty and staff, as well as the university's counseling center. These individuals are knowledgeable about students' concerns and stressors at various stages of their studies. Moreover, to develop a comprehensive curriculum that addresses various strategies for managing stressors that senior students or entry-level engineers may face, it is crucial to gather input from employers or supervisors who can identify the main stressors experienced by newly recruited engineers. Future studies should acknowledge the importance of conducting thorough educational evaluations to assess the course as a whole and enhance the curriculum's progression. In addition, a comprehensive educational evaluation would be necessary to measure the effectiveness of the curriculum in improving participants' knowledge and skills regarding mental health issues. Furthermore, to create a well-structured curriculum, it is crucial to consider the delivery method based on the subject matter, in order to enhance its attractiveness and efficiency.

Conclusion

Research has indicated that mental health issues are widespread among engineering students. Due to their personality traits, they may be hesitant to seek help or discuss their mental health issues. Providing additional psychological services alone is not sufficient to solve this problem as those in need may still not seek help. Despite the challenges posed by factors such as limited resources for mental health curricula in engineering, as well as potential issues related to funding, staffing, and scheduling, the inclusion of mental health education in the engineering curriculum is crucial for enhancing students' awareness and equipping them with the necessary tools to effectively manage mental health concerns in both academic and professional contexts. The purpose of this study was to gather data on the concerns and stress levels of engineering students in the fields of Civil, Architecture, and Construction Engineering. At the same time, the study tried to ask their opinion regarding required skills they feel they need to overcome mental challenges. The collected information will serve as a primary needs assessment and will provide insights into the development of mental health education programs for engineering students. To enhance the development of mental health curricula for engineering students, future research should conduct a comprehensive needs assessment program and involve a broader range of engineering disciplines in the process. To gain a deeper understanding of the mental health challenges and potential stressors faced by engineering students and entry-level engineers, seeking input from a variety of sources such as faculty members, counseling centers, and industry professionals could be beneficial. Furthermore, to create a curriculum that has a significant impact with measurable outcomes on a particular subject, it is essential to determine the most appropriate delivery method for the target audience.

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Appendix

Stress evaluation and preliminary need assessment for mental health curricula in engineering education

Demographic Information:

What is your age?

○ Below 20

○ 20-25

○ 26-30

○Above 30

Gender:

○ Female

○ Male

○ Transgender

○ Non-/binary

○ Prefer Not to answer

Ethnicity:

○American Indian or Alaska Native

○Asian

○ Black or African American

○ Hispanic or Latino

○ Native Hawaiian or Other Pacific Islander

○ White

Are you a first-generation student?

○Yes

○No

Do you have any identified mental disorders?

○ Yes

○ No

○ Prefer not to answer

Do you have any physical disabilities?

○Yes

○No

○Prefer Not to answer

Select your current field of study/Co-op/work:

○ Construction Engineering

○ Civil Engineering

○ Architecture Engineering

○ Other

Personal/family-related stressors:

For each question choose from the following alternatives:

0 - never	1 - almost never	2 - sometimes	3 - fairly often	4 - very often

1. In the last month, how often have you felt nervous and stressed?
2. In the last month, how often have you felt confident about your ability to handle your personal problems?
3. In the last month, how often have you found that you could not cope with all the things that you had to do?
4. In the last month, how often have you felt nervous about finding a proper job in your field after graduation?
5. In the last month, how often have you felt nervous about financial problems leading you to think more about finding a job immediately?
6. In the last month, how often have you had a conflict with your family/friends about your future career plan?
7. Over the past four weeks, how frequently have you experienced feelings of anxiety related to the prospect of future stress you may experience at work?
8. During the past four weeks, how frequently did you have feelings of low self-confidence regarding your abilities when considering your future job prospects?
9. How often have you experienced quarter-life crisis after your internship (uncertainty and not knowing the direction you need to follow in career life)?
10. How often do you compare yourself to your peers and perceive a sense of competition with them when contemplating your future career?

Work-related (university and work site) stressors:

Do you have a Co-op / Internship / Industry Experience?

○ Yes

○No

For each question choose from the following alternatives:

0 - never	1 - almost never	2 - sometimes	3 - fairly often	4 - very often

11. How stressed are you feeling about your internship as an engineering student and/or an entry-level engineer?
12. How confident are you in your ability to effectively communicate with your peers or colleagues in your field?
13. How confident do you feel in your ability to effectively communicate and attentively listen to the concerns of your colleagues in the future?
14. How often have you faced bullying and harassment as a young or new member during your academic/Co-op/internship experiences?
15. How comfortable are you with discussing your mental health with colleagues, supervisors, or professors?
16. How frequently have you felt nervous while communicating with co-workers at a job site or your teammate at university?
17. How frequently have you experienced gender discrimination that made you feel nervous during internship/Co-op/Academia?
18. How often have you experienced race/color discrimination leading you feel nervous during your internship/Co-op/Academia?
19. Have you ever sought help from counselor centers for mental health issues related to your job/studies as an engineering student/intern?
20. How often have you experienced a sense of not belonging in the field of study or industry/workplace you intend to pursue?

Mental health skills:

1. Based on your industry experience, on a scale of 1 to 5, how important is it to enhance your abilities in the following areas to promote and maintain the mental health of yourself and your coworkers?

1	2	3	4	5
Not at all important	Slightly important	Moderately important	Very important	Extremely important

Stress Management Skills	1	2	3	4	5

Decision Making Skills	1	2	3	4	5
Effective Communication Skills	1	2	3	4	5
Reducing Stigma and Seeking Support Skills	1	2	3	4	5

2. Please specify any other skills you feel should be taught in relation to promoting mental health.

3. In your opinion and on a scale of 1 to 5, how important do you consider it for undergraduate engineering students to receive mental health education before entering the industry?

1	2	3	4	5
Not at all important	Slightly important	Moderately important	Very important	Extremely important