Perceived Impact of Academic Stress on Mental Health Among Engineering Students in Nigerian Students

ABSTRACT

Aim: University students are a vulnerable population at risk of mental illness. Engineering students represent a sub-population of university students experiencing high academic stress and poor mental health outcomes. Despite the documented impact of academic stress on mental health and learning outcomes globally, engineering students in Nigerian tertiary institutions remain an under-researched group. Little is known about the unique contextual factors that contribute to academic stress and the perceived impact of academic stress on well-being among this group. This cross-sectional survey study examined the prevalence and impact of academic stress on the mental health of engineering students in 12 Nigerian universities, focusing on their unique experiences and the factors that contribute to stress.

Five hundred students from Civil, Mechanical, Electrical, Mining, Computer, and Agricultural Engineering departments at 12 universities across two geopolitical regions in Nigeria (Southwest and North Central). These students were invited to complete an anonymous survey. The surveys were distributed in person and online. The data was analyzed using SPSS version 20, and descriptive statistics and T-tests were performed.

Transportation to and from class emerged as a major source of stress, with 85.05% of respondents indicating it as a significant challenge. Over 80% of respondents reported that course-related factors such as struggles to understand lecture materials and lecturers' teaching styles are stressful. Financial concerns were also prevalent, with over 70% of respondents identifying them as a key stressor. When

asked about the overall stress level of their academic program, 44.86% rated it as extremely stressful, 35.51% as moderately stressful, 12.15% as mildly stressful, and 7.48% as not stressful. Furthermore, 26.17% of respondents reported that academic stress had a severe impact on their well-being.

The high prevalence of stress underscores the pressing need for targeted interventions that address the root causes of stress in this population. It is crucial for educators, academic administrators, and mental health professionals to recognize the stressors that engineering students in Nigeria face and offer appropriate support. By addressing these issues, school administrators can enhance student well-being and learning outcomes.

Keywords: *Mental health, academic stress, engineering students, South-west Nigeria, North-central Nigeria*

INTRODUCTION

Stress is characterized as a condition of anxiety or psychological strain resulting from Stress can be described as symptoms of psychological strain resulting from challenging life events. Stress is an inevitable part of human existence [1,2]. However, prolonged and continuous exposure to stress negatively impacts cognitive function, behavior, and health outcomes. Chronic stress has specifically been linked to increased rates of depression and anxiety [3,4].

University students face a greater level of psychological distress compared to the general population, with mental health issues being the most prevalent illness among university students globally. This increased susceptibility to emotional distress may stem from various factors such as syllabus workload, lengthy semester system, assessment anxiety and separation from family [5,6]. Research carried out in Nigeria indicated a 36.9% prevalence of general psychiatric disorders among undergraduate students [7,8].

Serfraz [9], identified multiple factors linked to stress among university students. These factors include but are not limited to challenging assignments, unsuitable scheduling, lecturer bias, and complex course curriculum. In several studies, academic stress among university students is associated with poor academic performance and low motivation [10].

Engineering education is an intense and exacting field of study, often leading to stress that can extend into professional careers [11]. As part of the curriculum, engineering students are expected to develop a broad range of proficiencies, including theoretical expertise, practical engineering skills, and interpersonal skills [11]. Some studies show that most engineering students experience elevated stress levels due to the rigorous curriculum, competitive academic environment, and demanding workload [12]. A study conducted at the Engineering College of Rajasthan in India discovered that 24.5% of undergraduate engineering students suffer from mental illnesses [13].

Understanding the underlying causes of academic stress is essential for formulating effective preventive strategies to alleviate its detrimental impacts on academic performance [14]. Cultural perceptions of mental health and social expectations of academic performance may influence mental health outcomes and shape students' learning and health outcomes [15]. Acknowledging this cultural context is essential for designing effective support systems tailored to the unique needs of this population.

Despite the rising amount of research on academic stress and mental health, few studies have focused on the specific experiences of engineering students in Nigeria, who are frequently subjected to tremendous academic expectations. Furthermore, the majority of the current literature has focused on students in Western countries, leaving a gap in institutional, cultural, and socioeconomic elements that could affect stress and mental health outcomes in Nigerian students. This gap was identified by reviewing existing studies that primarily concentrate on general student populations or those in non-technical fields [16]. This study aims to examine the prevalence and impact of academic stress on the mental health of engineering students in Nigeria, focusing on their experiences and the factors that contribute to this stress. The research aims to identify primary sources of stress, investigate its effect on mental health, and assess contributing factors, providing insights into the mental health challenges faced by this specific student demographic [17].

MATERIALS AND METHODS

This cross-sectional study investigated the factors contributing to academic stress among Nigerian engineering students. The target population consisted of undergraduate engineering students from institutions across two geopolitical regions in Nigeria: Southwest and North Central regions. A random sampling technique was used to select a representative sample of 500 students. This sample included Civil, Mechanical, Electrical, Mining, Computer, and Agricultural Engineering departments in twelve tertiary institutions in the selected geographical regions.

To ensure the validity of the survey instrument, the initial questionnaire draft underwent review by four experts (program advisors) randomly selected from the Department of Engineering at the participating institutions. Feedback and recommendations were incorporated, and the research team approved the final draft before survey distribution. The survey was modified to include and target distinct pressures and stressors experienced by engineering students, such as heavy workloads, high academic expectations, limited resources, and socioeconomic factors that are particularly relevant in Nigeria.

The study utilized a structured survey to examine the impact of academic stress on students' mental health and well-being. Two scales were developed and divided into three sections: demographic information (age, marital status, institution, department, and year of study), academic stress (factors including environmental, course-related, and economic stress), and the impact of academic stress on mental health (assessing symptoms of anxiety, depression, and overall well-being). This approach aimed to gather data on respondents' beliefs about their perceived stress level and the relationship between academic stress and mental health outcomes.

Surveys were distributed in person and online to maximize reach. Three hundred and ninety-three paper surveys were distributed in accessible areas on campus, and a research assistant was present to guide participants and collect completed surveys. A Google Forms version of the questionnaire was also filled out by 107 student group forums, and an electronic consent form was included. Informed consent was obtained from all participants, and confidentiality was strictly maintained throughout the study. This study was approved by the university institutional review board.

The data was analyzed using SPSS version 20, and descriptive statistics and T-tests were performed.

RESULT

Demographic information

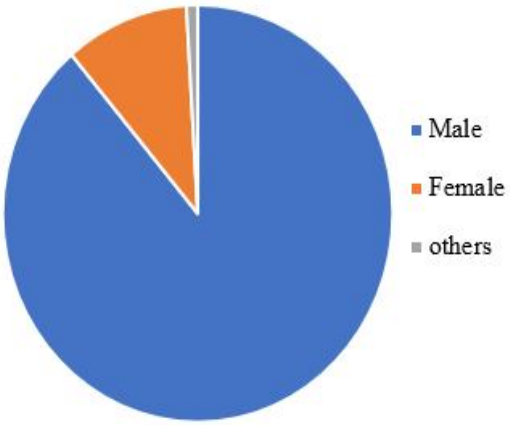

Figure 1a: Gender distribution

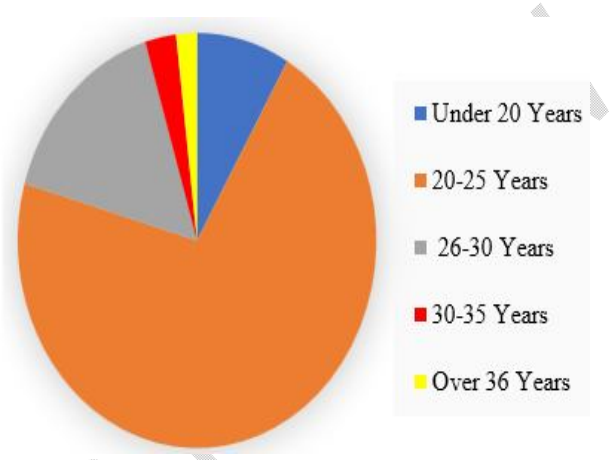

Figure 1b: Age distribution

Table 1: Demographic information of study respondents

Demography	**Year of Study**					
	Year 1	Year 2	Year 3	Year 4	Year 5	Others
N	17	34	14	15	26	1
%	15.89	31.78	13.08	14.02	24.3	0.93

Table 1 presents a summary of respondents' demographics. The data shows that out of the 107 engineering students who responded to the survey, 71.03 % were between 20 and 25 years old, while only 2% of the respondents were over the age of 36. For gender identity, 88.79 % identified as male, while 10.28% identified as female. Regarding education level, 47.67 % of respondents were in the second year of their program, while 52.33 % were in the third year of the program.

Academic stress level experienced by engineering students

The survey results, summarizing the overall level of academic stress experienced by engineering students, are presented in Table 2 and illustrated in Figure 2.

Table 2: Result of academic stress experience as an engineering

Academic stress levels	Stress level	Number of respondents	% Response
Not stressful	1	8	7.48
Mildly Stressful	2	13	12.15
Moderately Stressful	3	38	35.51
Extremely Stressful	4	48	44.86

Results show that 44.86 % of the respondents found the study of engineering extremely stressful, 35.51 % reported that it is moderately stressful, while 12.15 % and 7.48% found their program mildly stressful and not stressful, respectively. This is further illustrated in Figure 2.

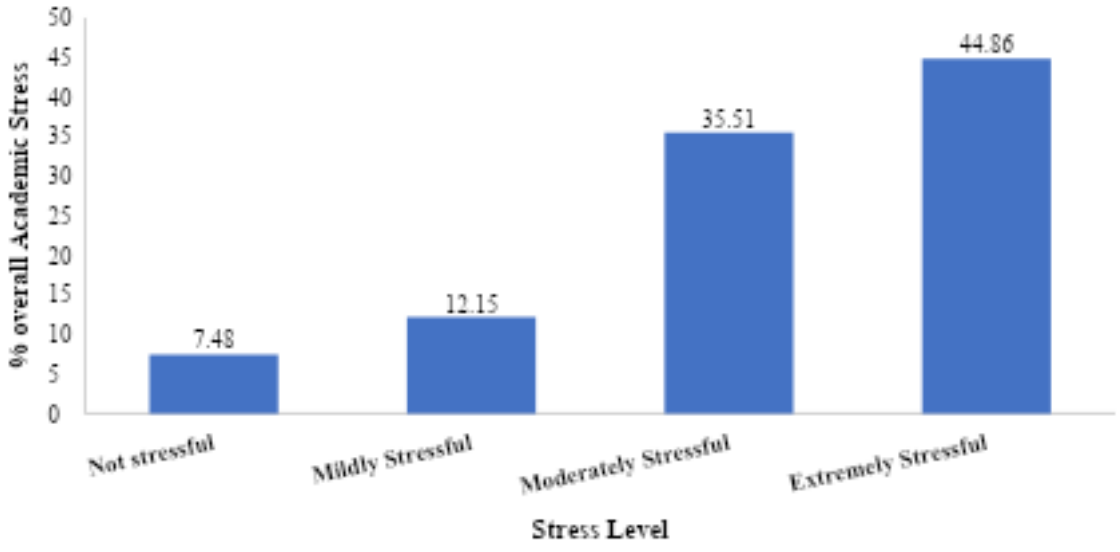

Figure 2: Response to overall academic stress experienced

Contributors to the overall academic stress by engineering students

Tables 3, 4, and 5 show the three causative factors that contribute to the overall academic stress experienced by engineering students in Nigerian tertiary institutions.

Table 3: Average environmental factors contributing to overall academic stress levels in engineering students

Environmental Factors	Stress Levels of Respondents (%)			
	Not Stressful (1)	Mildly Stressful (2)	Moderately Stressful (3)	Extremely Stressful (4)
Transportation to campus	14.95	26.17	30.84	28.04
Transitioning between classrooms	21.5	43.93	23.36	11.21
Attending lectures in overcrowded classrooms	22.43	29.91	18.69	28.97
Lectures in classrooms with poor or no lighting	19.63	22.43	24.3	33.64
Noisy classrooms	19.63	29.91	24.3	26.16
Classrooms with limited seats	24.3	23.36	19.63	32.71
Distractions in and outside the classrooms	27.1	33.64	16.82	22.43

The study identified several environmental factors that significantly disrupt students' focus, comfort, and engagement in the learning process, contributing to overall academic stress.

Under environmental factors, transportation emerged as a major stressor, with 85.05% of respondents indicating that challenges like long commutes, traffic congestion, and unreliable public transport were either extremely stressful, moderately stressful or mildly stressful, while only 14.95% did not find it stressful. Transitioning between classrooms on large campuses was reported as stressful by 78.50% of students, whereas 21.50% of respondents did not share this experience.

Overcrowded classrooms also contributed to stress, as 77.57% of students noted that limited personal space and increased noise were stressful to some degree (extremely, moderately, or mildly), while 22.43% did not consider it stressful. Poor classroom lighting was also noted as stressful by 80.37% of respondents, with 19.63% reporting no stress from this factor. Similarly, noise from both within and outside the classroom was highlighted by 80.37% of students as stressful, while 19.63% did not find it to be a stressor.

Limited seating options was mentioned by 75.70% of students as stressful, while 24.30% did not think it contributed to their stress levels. Finally, persistent distractions in and around the classroom were cited as stressful by 72.90% of respondents, while 27.10% did not find this to be stressful.

The average contribution of the environmental factor is shown in Figure 3.

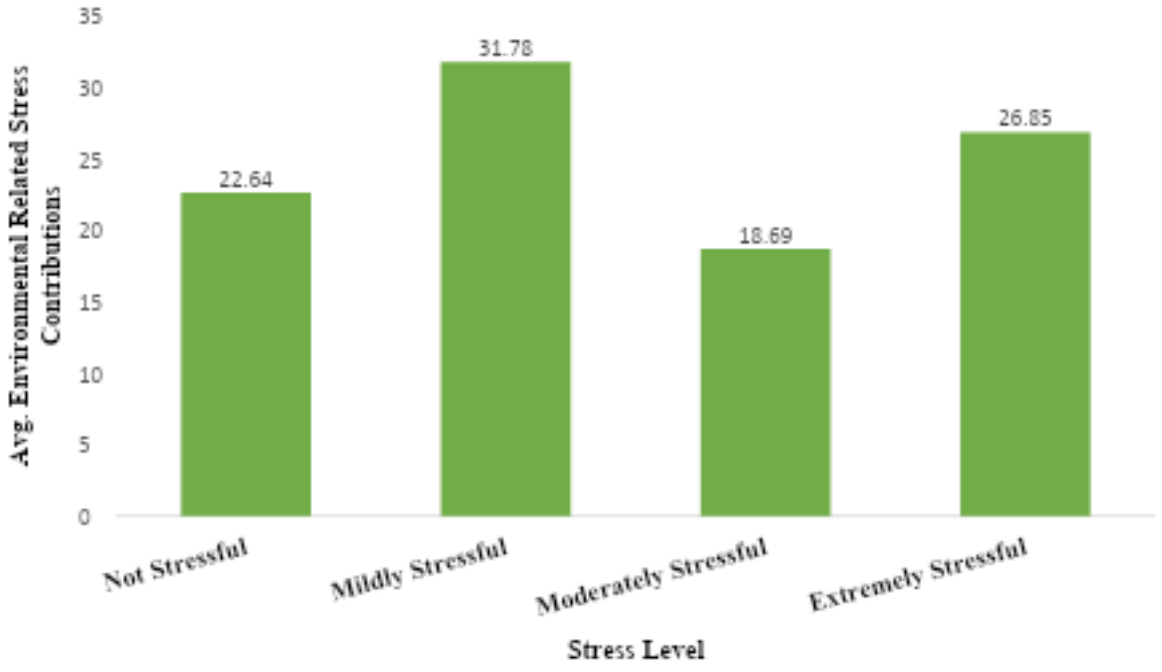

Figure 3: Average contribution of environmental factors to academic stress

Table 4: Average course related factors contributing to overall academic stress levels

Course Related Factors	**Stress Levels (%)**			
	Not Stressful (1)	**Mildly Stressful (2)**	**Moderately Stressful (3)**	**Extremely Stressful (4)**
Completing assignments	24.3	30.84	16.82	28.04
Understanding lectures in class	14.95	40.19	20.56	24.3
Impromptu tests and examinations	16.82	41.12	15.89	26.17
Preparing for Examinations	20.56	28.04	16.82	34.58

Passing carryover courses	24.3	27.1	15.89	32.71
Conducting laboratory experiments	19.63	23.36	29.91	27.1
Participating in fieldwork	24.3	26.17	23.36	26.17
Coping with lecturer's teaching styles	25.23	24.3	19.63	30.84
Group work/assignments	25.23	36.45	14.95	23.37
Time and length of lecture sessions	23.36	37.38	17.76	21.5
Competing with classmates	30.38	34.58	14.02	20.56

Engineering students, like many of their peers, experience significant academic stress due to course-related demands. Completing assignments under tight deadlines and understanding lectures can be overwhelming. The results presented in Table 4 show that 75.7 % of respondents report that completing assignments is stressful to some degree (extremely, moderately, or mildly), while 24.3 % find it not stressful. A significant percentage of respondents (85.05%) find understanding lectures in class stressful, while only 14.95% did not consider this stressful. Impromptu tests also add some academic stress, with 83.18% finding the impromptu tests and examinations (a common aspect of tertiary education in Nigeria) stressful and only 16.82 % stating that this was not stressful. Preparing for exams requires extensive study, which could lead to exhaustion, and the survey shows that 79.44 % of respondents find it stressful, while 20.56 % find it not stressful. Carryover courses (previously failed courses that students are retaking) contribute to significant stress, with 75.70% reporting that the pressure associated with carryover courses is stressful.

In comparison, 24.30% do not find it stressful. Under laboratory experiments and fieldwork, 80.37% of the respondents find laboratory experiments stressful, 75.70% find fieldwork stressful, while 19.63% and 24.30% find laboratory and fieldwork not stressful, respectively. Adjusting to varied teaching styles and managing group assignments introduce stress, especially when team dynamics or workload distribution are challenging. The survey shows that 74.77% of respondents find both the lecturer's teaching style and managing group assignments stressful, while 25.23 % find both factors not stressful. Extended lecture sessions cause mental fatigue, making it challenging to stay engaged, and the survey shows that 76.64 % find it stressful, while 23.3.

The average course-related stress contribution is shown in Figure 4.

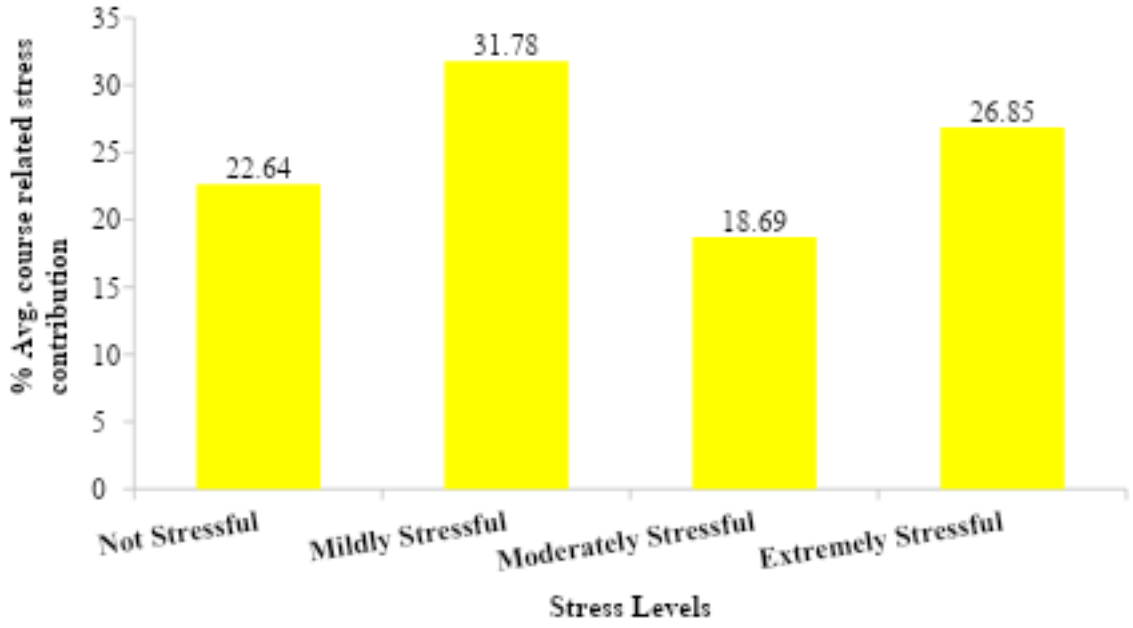

Figure 4: Average course-related stress contribution to Academic Stress

Table 5: Average economic factors contributing to overall academic stress levels

Economic Factors	**Stress Levels (%)**			
	Not	**Mildly**	**Moderately**	**Extremely**

	Stressful (1)	Stressful (2)	Stressful (3)	Stressful (4)
Affording tuition fees, textbooks or educational materials	24.3	20.56	17.76	37.38
Coping with part time job while in school	19.63	18.69	20.56	41.12
Thoughts of getting a job after college	14.02	23.36	22.43	40.19
Family's financial status	14.95	24.3	20.56	40.19
Handling expectations from family	14.02	28.97	17.76	39.25
Handling self-expectation	18.69	23.37	22.43	35.51

Economic factors were a significant source of academic stress for respondents. Financial pressure includes the cost of tuition, textbooks, and other educational materials. The survey shows that 75.70% of respondents consider this economic factor stressful, while 24.30% reported it as not stressful. Many engineering students stated that balancing part-time jobs with academic demands was stressful, as work hours reduce the time available for studying and rest, leading to fatigue.

Generally, concerns about securing a job after graduation as an engineering student also weighed heavily on respondents. Students reported that they worried about financial independence, with 85.98% reporting this economic factor as stressful, while 14.02% found it not stressful. The survey shows that 85.05% are stressed by family financial status, while 14.95% are not. Also, 85.98% are stressed by family expectations while 14.02% are not. Also, 81.31% of respondents are stressed by handling their self-imposed expectations, while 18.69% are not stressed by it.

The average economic-related factor contribution to academic stress is shown in Figure 5.

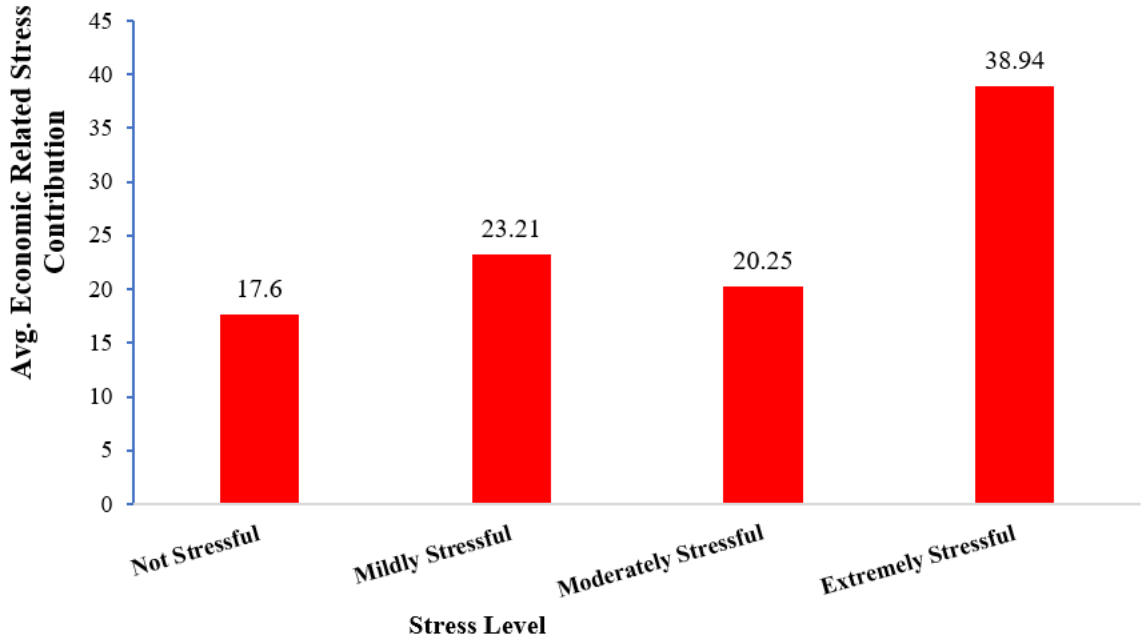

Figure 5: Average economic-related stress contribution to Academic Stress

Assessment of academic stress on mental health and well-being

Academic stress has a significant impact on the mental health and overall well-being of engineering students. When stress from contributors of stress becomes overwhelming, it can lead to various mental health issues, including anxiety, depression, and burnout. It was, therefore, important to assess the various symptoms of mental health and well-being that may be prevalent among engineering students in Nigerian tertiary institutions. The result of the assessment conducted in our survey is shown in Table 6.

Table 6: Assessment of mental health and well-being symptoms

Symptoms	**% Assessment of Symptoms**				
	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

I frequently experience stress-related feelings like tension, irritability, or restlessness due to academic pressure.	13.08	14.02	18.69	26.17	28.04
I find it challenging to concentrate or focus on tasks due to academic stress concentrate or focus on tasks due to academic stress.	11.22	14.95	26.17	26.17	21.49
My ability to think clearly or make decisions is compromised under academic pressure.	14.02	16.82	21.49	29.91	17.76
I frequently experience physical discomfort, such as headaches, nausea, vomiting, and diarrhea due to academic stress.	19.62	21.49	15.89	16.82	26.17
It's rare for me to get 6-8 hours of quality sleep on most nights.	14.02	13.08	14.95	20.56	37.38
I struggle to maintain friendships and relationships with peers when stressed	18.69	14.95	19.63	28.04	18.69
Average Impact of Academic Stress on Mental health and Well-being deficiencies (Symptoms)	15.12	15.89	19.47	24.61	24.92

The survey result in Table 6 reveals that an average of about 49.53% agree with the mental health and well-being symptoms stated in the questionnaire, 15.12 % disagree with the statements, and 19.47 % are neutral about the statements. Based on this assessment, it can be said that a significant majority of engineering students in tertiary institutions in Nigeria exhibit these symptoms due to the academic stress experienced by the prevailing academic stress factors among engineering students.

Perceived impact of academic stress on students' mental health and well-being

Table 7 shows the severity of the impact of the prevalent academic stress on students' mental health and well-being.

Table 7: Impact Assessment of symptoms on student mental health and well-being

Impact Assessment of Symptoms	Impact Level	Number of respondents	% Response
Minimal Impact	1	12	11.21
Minor Impact	2	9	8.41
Moderate Impact	3	34	31.78
Significant Impact	4	24	22.43
Severe Impact	5	28	26.17

The impact assessment of academic stress on the mental health and well-being of engineering students in the survey result (see Table 7) shows that 26.17 % of the respondents rate the impact of academic stress on the mental health and well-being of engineering students to be severe, 22.43 % believe it has a significant impact while 11.21 %, 8.41 %, and 31.78 % of the respondents think it has a minimal, minor, and moderate impact on engineering students' mental health and well-being in Nigerian tertiary institutions, respectively.

DISCUSSION

The predominant age range in this study was 20 to 25 years. There was also significant gender disparity, with most participants identifying as male. This result is supported by prior studies that show that engineering programs are predominately male [18-21]. The study found that female students in Nigeria are particularly underrepresented in electrical, mechanical, and civil engineering programs. Abdullahi et al. [21] attributed this disparity in gender enrolment to harmful cultural and religious beliefs, negative stereotypes about gender and academic capabilities, early marriage, and family factors such as low socioeconomic status and parents' educational background.

The findings revealed that the majority of respondents perceive their engineering studies as moderately to severely stressful. Three primary stressors were identified: environmental, course-related, and economic factors. Environmental and course-related stressors collectively contributed to stress levels in more than half of respondents, while economic factors were noted as significant stressors. Financial stress remained a substantial factor, especially for students from lower socioeconomic backgrounds, as the cost of engineering programs, particularly private institutions, poses a significant burden. This might be due to the emotional burden and sense of responsibility that respondents from financially constrained backgrounds may feel about contributing financially to their families. Some students may also feel pressured to meet high academic and career standards, fearing they might disappoint their loved ones. Self-imposed expectations to succeed, often worsened by the financial sacrifices made by families, can also intensify stress, particularly when facing academic setbacks such as carryovers. Addressing these economic stressors through financial counseling, mental health support, and specific financial aid options such as scholarships, grants, and part-time job opportunities may help mitigate some of the stress experienced by students.

Respondents also noted that course-related issues were a significant source of stress, withlaboratory experiments being one of the most stressful course-related activities. Laboratory experiments require a high level of precision, which can be demanding. Limited resources, such as modern laboratories and practical training facilities, further exacerbate the stress experienced by engineering students in Nigeria. To compensate for these gaps, students seek additional materials outside the school environment, which

can lead to increased fatigue and burnout. School administrators should provide access to educational resources and equipment to aid learning for engineering students. This result is similar to those found by Okoroafor et al. [20], which found that a lack of adequate instructional and laboratory materials negatively impacts learning outcomes and contributes to the gender disparity among engineering students in Nigeria. Okoroafor et al. further suggested that efforts should be made by public and private bodies to provide adequate instructional materials for students' learning. These efforts could also reduce the gender disparity in engineering programs [22]. For instance, providing gender-inclusive resources and facilities may encourage more female students to enroll and complete their engineering program. The authors also recommended that teachers employ approaches such as constructivism and guided inquiry to increase class engagement and learning outcomes. This recommendation is particularly relevant for the engineering departments included in this study, as most respondents identified “trying to understand lectures and materials” and lecturers’ teaching styles as significant sources of stress.

For these respondents, there was an overwhelming belief that academic stress was negatively impacting their mental health and well-being. This result is validated by previous studies that show high academic stress levels and declining mental health among engineering students [11,12].

The high prevalence of stress noted in this study underscores the pressing need for interventions that address the root causes of stress in this population. By implementing strategies like mental health support services and stress management workshops and fostering a supportive academic environment, tertiary institutions in Nigeria can promote students' well-being and learning outcomes [23,24].

Limitations

This study had some limitations that may impact the generalizability and interpretation of the findings. The sample size was low, which means that the respondents in this study may not be fully representative of the target population. There is also the potential for non-response bias, as those who chose not to participate may differ meaningfully from respondents, potentially skewing the results. There is also the possibility of social desirability bias. These limitations highlight the need for future research to consider

ways to mitigate these issues by offering incentives for study participation and follow-up interviews to get richer data.

CONCLUSION

In conclusion, academic stress can be particularly severe for engineering students due to the demanding nature of the academic work that needs to be done. This research set out to investigate the prevalent factors associated with academic stress among engineering students in Nigerian tertiary institutions. The findings from this study underscore the urgent need for support systems, including mental health resources, a conducive learning environment, access to state-of-the-art laboratories, and provision of financial aid, to foster a more supportive and inclusive educational environment for engineering students.

COMPETING INTERESTS DISCLAIMER

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

CONSENT AND ETHICAL APPROVAL

All authors hereby declare that this study was reviewed and approved by the institutional review committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. All participants were informed of their rights to decline participation and withdraw from the study at any point without consequences. All participants gave their informed consent to participate in the study.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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