

Perceived Stress and Test Anxiety among Undergraduate Engineering Students at a University in Western Nepal: A Cross-sectional Study

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ABSTRACT

Introduction: Psychological well-being of university students is a growing public health concern, with engineering students particularly vulnerable due to rigorous academic demands. Evidence of mental health burden among Nepalese students is increasing, but data on engineering undergraduates remain scarce. This study aimed to determine the prevalence of perceived stress and test anxiety among undergraduate engineering students at a university in western Nepal.

Methods: A cross-sectional study was conducted among 202 undergraduate engineering students in western Nepal after ethical approval from the Nepal Health Research Council (Registration No. 690). Proportionate stratified random sampling was used. Perceived stress and test anxiety were assessed using the PSS-14 and TAS-10. Data were analyzed in SPSS version 20.0 using descriptive statistics, 95% CIs, the Chi-square test, Fisher's exact test, and Spearman's correlation.

Results: Among 202 students, unhealthy test anxiety prevalence was 18 (8.91%) with median TAS score 24 (IQR:12), and 175 (86.63%) had moderate-to-high perceived stress, with mean PSS-14 score 26.56±8.08. Unhealthy anxiety was present in 10 (4.95%) females and 8 (3.96%) males, whereas, no anxiety in 13 (6.44%) females and 44 (21.78%) males. High perceived stress was reported by 8 (3.96%) students with family/peer pressure and 7 (3.47%) with personal interest as reason for choosing engineering, and low perceived stress by 6 (2.97%) and 21 (10.40%) respectively.

Conclusions: A substantial proportion of undergraduate engineering students experienced moderate-to-high perceived stress and test anxiety. Gender-sensitive and targeted mental health interventions are recommended, and multicentre studies are needed to assess the generalisability of these findings across engineering colleges in Nepal.



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INTRODUCTION

Mental health among university students has emerged as one of the impacting concerns in higher education globally. A comprehensive review of 62 meta-analyses reported pooled prevalence estimates of approximately 40.21% for mild anxiety and 36.34% for stress among university students.¹ Engineering students are at particular risk owing to rigorous curricula, intensive laboratory components, frequent high-stakes assessments, and a culture in which academic stress is normalized.²

In Nepal, approximately one-in-10 adults has experienced a mental health condition during their lifetime.³ Despite growing evidence of mental health burden among students, research on engineering undergraduates remains limited, with no prior study jointly examining perceived stress and test anxiety.^{4,5} The rapid expansion of engineering institutes in Nepal, many facing challenges related to updated curricula, and under-resourced academic mental health infrastructure, further underscores this gap.⁶

This study aimed to find out the prevalence of perceived stress and test anxiety and their sociodemographic correlates among undergraduate engineering students in a university in Nepal, and to examine the correlation between the two constructs.

METHODS

A cross-sectional study was conducted among undergraduate students at a university in western Nepal. Data collection was carried out over six months from 2nd October 2024 to 2nd April 2025. Ethical approval was obtained from the Institutional Review Board of Mid-West University and Nepal Health Research Council with Registration number: 690. Data collection for participants of each academic year was scheduled during regular teaching periods according to their respective academic calendar, avoiding the weeks immediately preceding, during, or immediately following examinations, so that participants across the study period completed the questionnaire under comparable academic conditions.

The study population comprised 350 students enrolled in Bachelor programs in Civil Engineering, Computer Engineering, and Hydropower Engineering across all four academic years. Students enrolled in any of the above programs who were present during academic activities and provided written consent were included. Those with a prior diagnosis of any mental disorder, under active psychiatric treatment, on leave, under academic suspension, or declining consent were excluded, as these conditions could independently affect scale scores or the ability to complete the questionnaire under standard conditions.

Sample size was calculated at 95% Confidence Interval with 5% margin of error and 50% prevalence for maximum sample size estimation:

$$n = (Z^2 \times p \times q) / e^2 = (1.96^2 \times 0.50 \times 0.50) / 0.05^2 = 384$$

Adjusted for finite population ($N = 350$): $n' = n / [1 + (n - 1) / N] = 384 / [1 + (384 - 1) / 350] = 184$. With a 10% non-response rate, the final sample size was 202. An a priori power exploratory analysis for chi-square test of independence was conducted using G*Power (version 3.1.9.7), assuming a medium effect size (Cohen's $w = 0.30$), $\alpha = 0.05$, power $(1 - \beta) = 80\%$ and degree of freedom(df)= 6, largest contingency table being 4x3; as a general benchmark rather than for a single, primary association,¹³ yielding a minimum sample of 167 after non-response adjustment. As the additional G*Power assessment showed that the achieved sample size exceeded the minimum required for the exploratory chi-square analyses under the pre-specified assumptions, the available sample was considered adequate for these exploratory analyses.

Proportionate stratified random sampling was employed with strata defined by academic year and department, using the formula $n_x = (N_x / N) \times n$. Random selection within strata was performed using the RAND function in Microsoft Excel. If a selected participant did not consent to participate, the next individual from the same stratum list was substituted.

Data were collected using a self-administered questionnaire comprising three parts: sociodemographic and background profile; Perceived Stress Scale-14; and Test Anxiety Scale. Sociodemographic variables included age, gender, academic year, department of engineering, current engagement in a job or internship, weekly class hours, reason for choosing engineering, recent emotional setbacks such as death of near-ones, breakup within the past six months, and habit of smoking & alcohol use.

Perceived stress was assessed using the self-report 14-item Perceived Stress Scale (PSS-14) developed by Cohen et al., grounded in the transactional model of stress and coping and has demonstrated good reliability and validity across diverse populations.⁷⁻⁹ Items are rated on a 5-point Likert scale (0: never to 4: very often); seven positively worded items are reverse-scored before summing all 14 items. Total scores range from 0 to 56, categorized as low (0–18), moderate (19–37), or high (38–56) perceived stress. Test anxiety was assessed using the 10-item Test Anxiety Scale (TAS) developed by Nist and Diehl.^{10,11} Items are rated on a 5-point Likert scale (1: never to 5: always). Total scores range from 10 to 50, categorized as no anxiety (10–19), healthy anxiety (20–34), or unhealthy anxiety (35–50).

The questionnaire, including the PSS-14 and Test Anxiety Scale, was administered in its original English version without translation, as English is the medium of instruction at the college and all participants were proficient in academic English. Cronbach's alpha for the TAS was 0.893 and for the PSS-14 was 0.787 in the study sample, indicating good internal consistency for both instruments. However, the categories are descriptive groupings, as both scales are self-reported instruments, and hence may not represent clinical diagnostic thresholds.

Data were collected by the researchers using a structured, self-administered paper-based questionnaire. Eligible participants were informed about the study objectives, and written informed consent was obtained prior to participation. The researchers clarified any queries during questionnaire completion and checked the completed questionnaires for completeness before collection.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics were presented as frequencies and percentages for categorical data, and mean $\pm$ standard deviation (SD) or median (Md) and interquartile range (IQR) for continuous data. Point estimate at 95% Confidence Interval was calculated. Normality was assessed using the Shapiro-Wilk test: PSS-14 scores were normally distributed [$W(202) = 0.991$, $p > 0.05$], while TAS scores were not [$W(202) = 0.970$, $p \leq 0.05$]. Group comparisons for categorical variables used Pearson chi-square or Fisher's exact test (for expected cell counts < 5). Spearman's rank-order correlation coefficient (rs) was used for ordinal-level correlation. A p -value < 0.05 was considered statistically significant.

RESULTS

Two hundred and two undergraduate engineering students

completed the questionnaire, representing a 100% response rate, not requiring any replacement of initial participants. The sample comprised 138 (68.32%) male and 64 (31.68%) female students, with a mean age of 21.88 ± 3.26 years. Departmental distribution was: 92 (45.54%) from Computer Engineering, 74 (36.64%) from Civil Engineering, and 36 (17.82%) from Hydropower Engineering. One hundred fifty-seven (77.72%) were engaged in a job or internship, and 142 (70.30%) attended 20–30 hours of class per week. Personal interest was the primary reason for choosing engineering in 150 (74.26%) students; 52 (25.74%) cited family or peer pressure. Sixty-eight (33.66%) reported a recent emotional setback within the preceding six months; 22 (10.89%) were current smokers and 27 (13.37%) reported alcohol use. (Table 1).

The prevalence of unhealthy test anxiety was 18 (8.91%), with healthy anxiety in 127 (62.87%) and no anxiety in 57 (28.22%). The median TAS score was 24 (IQR: 12), ranging from 10 to 50. The mean PSS-14 score was 26.56 ± 8.08 (25.44–27.68 at 95% Confidence Interval), with a median of 27, ranging from 0 to 47. Moderate perceived stress was present in 160 (79.20%), high perceived stress in 15 (7.43%), and low perceived stress in 27 (13.37%).

Item-level analysis of the TAS revealed that sleep disruption the night before an examination was the most frequently endorsed symptom, with 54 (26.74%) participants responding “often” or “always.” Post-test recall of previously blanked information was endorsed by 40 (19.81%), difficulty choosing answers by 36 (17.83%), and making mistakes on easy questions by 31 (15.35%). Panic before or during a test was reported by 32 (15.84%), and mind going blank during a test by 33 (16.34%). Visible signs of nervousness such as sweaty palms or shaky hands were reported by 26 (12.87%) and nausea before a test by 23 (11.39%) participants. (Table 2)

Table 1. Demographic and background profile (n=202).

Characteristic	n(%)
Gender	
Male	138(68.32)
Female	64(31.68)
Year of study	
Year 1	48(23.76)
Year 2	59(29.21)
Year 3	41(20.29)
Year 4	54(26.73)
Department	
Computer Engineering	92(45.54)
Hydropower Engineering	36(17.82)
Civil Engineering	74(36.64)
Job/internship	
Yes	157(77.72)
No	45(22.28)
Hours of class per week	
0–10	27(13.37)
10–20	33(16.33)
20–30	142(70.30)
Reason for choosing engineering	
Personal interest	150(74.26)
Family/peer pressure	52(25.74)
Recent emotional setback	
Yes	68(33.66)
No	134(66.34)
Smoking	
Yes	22(10.89)
No	180(89.11)
Alcohol use	
Yes	27(13.37)
No	175(86.63)

Table 2. Item-wise distribution of responses on the Test Anxiety Scale (N=202).

Item	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)
Visible signs of nervousness (sweaty palms, shaky hands) before a test	70(34.65)	37(18.32)	69(34.16)	15(7.43)	11(5.44)
"Butterflies" in the stomach before a test	74(36.63)	47(23.27)	56(27.72)	13(6.44)	12(5.94)
Nausea before a test	70(34.65)	55(27.23)	54(26.73)	9(4.46)	14(6.93)
Feeling of not knowing answers after reading through the test	50(24.75)	47(23.27)	68(33.66)	20(9.90)	17(8.42)
Panic before and during a test	55(27.23)	49(24.26)	66(32.67)	18(8.91)	14(6.93)
Mind goes blank during a test	56(27.72)	54(26.73)	59(29.21)	18(8.91)	15(7.43)
Remembering blanked information after leaving the testing situation	44(21.78)	52(25.74)	66(32.67)	25(12.38)	15(7.43)
Trouble sleeping the night before a test	46(22.77)	37(18.32)	65(32.18)	27(13.37)	27(13.37)
Making mistakes on easy questions or placing answers incorrectly	42(20.79)	51(25.25)	78(38.61)	15(7.43)	16(7.92)
Trouble choosing answers during a test	43(21.29)	41(20.30)	82(40.59)	21(10.40)	15(7.43)

Among male students, 44 (21.78%) reported no anxiety, 86 (42.57%) healthy anxiety, and 8 (3.96%) unhealthy anxiety. Among female students, 13 (6.44%) reported no anxiety, 41 (20.30%) healthy anxiety, and 10 (4.95%) unhealthy anxiety. For perceived stress, 21 (10.40%) males reported low, 110 (54.46%) moderate, and 7 (3.47%) high perceived stress; among females,

6 (2.97%) reported low, 50 (24.75%) moderate, and 8 (3.96%) high perceived stress. Among students who chose engineering out of personal interest, 47 (23.27%) reported no anxiety, 91 (45.05%) healthy anxiety, and 12 (5.94%) unhealthy anxiety; 21 (10.40%) reported low, 122 (60.40%) moderate, and 7 (3.47%) high perceived stress. Among those who chose engineering due

Table 3. Distribution of test anxiety and perceived stress categories among background factors (N=202).

Background factor	Test anxiety: No n(%)	Test anxiety: Healthy n(%)	Test anxiety: Unhealthy n(%)	Perceived stress: Low n(%)	Perceived stress: Moderate n(%)	Perceived stress: High n(%)
Gender						
Male	44(21.78)	86(42.57)	8(3.96)	21(10.40)	110(54.46)	7(3.47)
Female	13(6.44)	41(20.30)	10(4.95)	6(2.97)	50(24.75)	8(3.96)
Year of study						
Year 1	14(6.93)	29(14.36)	5(2.48)	4(1.98)	40(19.80)	4(1.98)
Year 2	17(8.42)	34(16.83)	8(3.96)	9(4.46)	46(22.77)	4(1.98)
Year 3	14(6.93)	25(12.38)	2(0.99)	4(1.98)	33(16.34)	4(1.98)
Year 4	12(5.94)	39(19.31)	3(1.49)	10(4.95)	41(20.30)	3(1.49)
Department						
Computer Engineering	29(14.36)	52(25.74)	11(5.45)	7(3.47)	77(38.12)	8(3.96)
Hydropower Engineering	13(6.44)	22(10.89)	1(0.50)	5(2.48)	28(13.86)	3(1.49)
Civil Engineering	15(7.43)	53(26.24)	6(2.97)	15(7.43)	55(27.23)	4(1.98)
Job/internship						
Yes	46(22.77)	95(47.03)	16(7.92)	19(9.41)	126(62.38)	12(5.94)
No	11(5.45)	32(15.84)	2(0.99)	8(3.96)	34(16.83)	3(1.49)
Class hours/week						
0–10	6(2.97)	21(10.40)	0(0)	6(2.97)	19(9.41)	2(0.99)
10–20	5(2.48)	25(12.38)	3(1.49)	7(3.47)	24(11.88)	2(0.99)
20–30	46(22.77)	81(40.10)	15(7.43)	14(6.93)	117(57.92)	11(5.45)
Reason to choose engineering						
Personal interest	47(23.27)	91(45.05)	12(5.94)	21(10.40)	122(60.40)	7(3.47)
Family/peer pressure	10(4.95)	36(17.82)	6(2.97)	6(2.97)	38(18.81)	8(3.96)
Recent emotional setback						
Yes	17(8.42)	42(20.79)	9(4.46)	7(3.47)	53(26.24)	8(3.96)
No	40(19.80)	85(42.08)	9(4.46)	20(9.90)	107(52.97)	7(3.47)
Smoking						
Yes	5(2.48)	14(6.93)	3(1.49)	4(1.98)	15(7.43)	3(1.49)
No	52(25.74)	113(55.94)	15(7.43)	23(11.39)	145(71.78)	12(5.94)
Alcohol use						
Yes	7(3.47)	17(8.42)	3(1.49)	3(1.49)	21(10.40)	3(1.49)
No	50(24.75)	110(54.46)	15(7.43)	24(11.88)	139(68.81)	12(5.94)

to family or peer pressure, 10 (4.95%) reported no anxiety, 36 (17.82%) healthy anxiety, and 6 (2.97%) unhealthy anxiety; 6 (2.97%) reported low, 38 (18.81%) moderate, and 8 (3.96%) high perceived stress. The distribution of test anxiety and perceived stress categories across remaining background factors (Table 3).

Spearman's rank-order correlation revealed statistically significant association between TAS and PSS-14 scores with moderate positive correlation ($r^s = 0.464$, $p < 0.001$). The categories of TAS and PSS-14 also showed statistically significant association ($\chi^2 = 36.81$, $p < 0.001$). Among students with unhealthy test anxiety, nine (4.46%) had moderate perceived stress and nine (4.46%) had high perceived stress; no student with unhealthy anxiety reported low perceived stress. Among those with healthy anxiety, 17 (8.41%) had low, 104 (51.48%) had moderate, and six (2.97%) had high perceived stress (Table 4).

Table 4. Cross-tabulation of test anxiety and perceived stress categories(N=202).

Test anxiety category	Low perceived stress	Moderate perceived stress	High perceived stress
No anxiety	10(4.95)	47(23.27)	0(0.00)
Healthy anxiety	17(8.41)	104(51.48)	6(2.97)
Unhealthy anxiety	0(0.00)	9(4.46)	9(4.46)

DISCUSSION

This cross-sectional study examined perceived stress and test anxiety among undergraduate engineering students at an engineering college in Nepal. The mean PSS-14 score of 26.56 ± 8.08 and the predominance of moderate perceived stress (79.20%) indicate a substantial psychological burden. This is broadly consistent with data from Nepalese student

cohorts: a study of higher-secondary and undergraduate students during the COVID-19 pandemic reported a mean PSS-10 score of 20.2 ± 5.5 , with 77.2% experiencing moderate stress.¹² A study from Pokhara Metropolitan, Nepal found stress and anxiety prevalence of 24.1% and 46.9%, respectively.¹³ The comparatively higher PSS-14 scores in the current study may reflect the compounded academic demands specific to engineering curricula, characterized by intensive technical content, frequent high-stakes assessments, and a normalized culture of stress.² Concurrent engagement in jobs or internships in 157 (77.72%) students may have further augmented stress levels. This is in line with evidence that students in technically demanding programs such as medicine, law, and engineering have higher burnout rates than the peers in less intensive courses.¹⁴

The prevalence of unhealthy test anxiety (8.91%) and healthy anxiety (62.87%) suggests that although unhealthy test anxiety, as categorized by this instrument, is not highly prevalent, a notable minority of students scored in this range. A substantial proportion of medical students in Pakistan reported moderate-to-high test anxiety with an inverse correlation with academic performance.¹⁵ Item-level analysis identified sleep disruption before examinations as the most commonly endorsed symptom (26.74%), followed by post-test recall of blanked information (19.81%) and difficulty choosing answers (17.83%). These patterns reflect the cognitive and physiological components of test anxiety described in the classical worry-emotionality framework, wherein performance-related worry and somatic arousal together predict examination underperformance.

Female students were more likely to be classified in the unhealthy anxiety category (4.95%) than male students (3.96%), and male students were more likely to be classified as having no anxiety (21.78% vs. 6.44%). This gender disparity is well-documented across Science, Technology, Engineering, and Mathematics (STEM) disciplines with female students reporting higher test anxiety than male peers.^{16–18} This partly reflects differential socialization and greater willingness to acknowledge emotional distress.¹⁶ Harris et al. found that women declared higher test anxiety in an undergraduate STEM cohort, associated with lower examination scores.¹⁷ In the South Asian context, female engineering students face compounded pressures arising from gender minority status in a male-dominated academic environment, potentially amplifying evaluation-related anxiety.¹⁹

Students enrolled due to personal interest had a higher proportion in the low stress category compared to those enrolled due to family or peer pressure. This aligns with motivational theory, where intrinsic motivation for program enrollment is associated with lower perceived stress and more adaptive coping strategies.²⁰ This is theoretically grounded in self-determination theory, where perceived autonomy serves as a buffer against academic stressors. Students pursuing a program under external obligation are more likely to appraise academic demands as threatening rather than challenging.⁸ In Nepal, where family influence on career decisions is substantial, this finding resonates with observations from similar South and Southeast

Asian contexts.²¹ Several background variables, including year of study, recent emotional setbacks, smoking, and alcohol use, had neutral outlook across perceived stress or test anxiety categories. The lack of any effect of year-of-study contrasts with prior reports of increasing stress across academic years.¹²

A moderate positive correlation was found between TAS and PSS-14 scores ($r^s = 0.464$, $p < 0.001$), and no student in the unhealthy anxiety group reported low perceived stress (Table 4). This directional relationship is coherent within the transactional model of stress, wherein perceptions of environmental demands exceeding coping resources generate both generalized stress appraisals and domain-specific anxious responses.⁸ Interventional research using Acceptance and Commitment Therapy among university students demonstrated parallel reductions in both PSS-14 scores and test anxiety following the same brief intervention, supporting possible shared underlying processes.²² Academic stress has been established as a predictor of anxiety symptomatology in university students across diverse settings.²³ These findings argue for integrated rather than separate screening approaches.

This study contributes to the limited literature on the psychological health of engineering students in low- and middle-income countries (LMICs), where mental health resources remain scarce relative to the burden of distress.⁶ Stress management interventions in LMIC university settings have been found effective, yet institutionalized screening and referral pathways remain rare.²⁴ Targeted, low-resource interventions including mindfulness-based approaches and pre-examination expressive writing, which have demonstrated efficacy in reducing test anxiety in STEM settings, represent feasible implementation options.¹⁷

This study employed proportionate stratified random sampling across all four academic years and three departments, achieving a 100% completion rate among the final sample; both instruments demonstrated good internal consistency. Limitations include the cross-sectional design, which precludes causal inference. The study was conducted at a single institution, limiting generalizability. The questionnaire did not screen for co-morbid depression or anxiety disorders as independent outcomes. Self-reported data are susceptible to social desirability bias, particularly given cultural stigma around mental health disclosure in Nepal. Exclusion of students with a prior mental health diagnosis or under psychiatric treatment likely isolated stress and anxiety attributable to academic demands; however, this might underestimate the overall burden in the complete student population.

CONCLUSION

A large proportion of undergraduate engineering students reported moderate-to-high perceived stress, and a notable minority demonstrated unhealthy test anxiety. Female gender was associated with higher test anxiety, and reason for choosing engineering was associated with differing perceived stress category distributions. The positive correlation between the two

constructs argues for integrated mental health screening and intervention. Gender-sensitive, motivation-aware approaches and institutionalization of evidence-based mental health support programs are recommended to safeguard the psychological well-being and academic success of engineering undergraduates, with further multi-centre research warranted.

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literature review, data review and analysis, manuscript review; **Yasab Khadka:** Concept, literature review, data collection and entry, manuscript review.

Conflict of Interest: Jebish Pradhan and Mili Koirala serve as Section Editors of the Journal of Nepal Medical Association (JNMA). They had no involvement in the editorial assessment, peer-review process, or final decision regarding the acceptance of this manuscript. The remaining authors declare no competing interests.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical considerations: Ethical approval was obtained from the Nepal Health Research Council with Registration number: 690, and on fulfilling necessary guidelines.

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