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PREVALENCE OF ANXIETY, DEPRESSION, AND SLEEP DISTURBANCES AMONG MEDICAL STUDENTS IN PAKISTAN AND THEIR ASSOCIATION WITH ACADEMIC STRESS

Original Research

Ruqia Safdar Bajwa[1]*
[1] *Assistant Professor, PhD Psychology, Department of Applied Psychology, Bahauddin Zakariya University, Multan, Pakistan*
[2] *Affiliation*
[3] *Affiliation*
[4] *Affiliation*

Corresponding Author: Ruqia Safdar Bajwa, ruqiasafdar@bzu.edu.pk, Assistant Professor, PhD Psychology, Department of Applied Psychology, Bahauddin Zakariya University, Multan, Pakistan

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ABSTRACT

BACKGROUND: Medical education is globally recognized as a highly demanding and stressful academic pursuit, often resulting in significant psychological distress among students. In Pakistan, the intense academic load, limited support systems, and sociocultural pressures contribute to heightened vulnerability to anxiety, depression, and sleep disturbances. Understanding these interrelated factors is essential to improve student well-being and academic outcomes.

OBJECTIVE: To determine the prevalence of anxiety, depression, and sleep disturbances among medical students in Pakistan and assess their association with academic stress.

METHODOLOGY: This cross-sectional analytical study was conducted over eight months (November 2022–June 2023) across five medical colleges in Pakistan. A total of 410 MBBS students were recruited through stratified random sampling. Data were collected using validated tools: the Perceived Stress Scale (PSS-14) for academic stress, the Depression Anxiety and Stress Scale (DASS-21) for psychological distress, and the Pittsburgh Sleep Quality Index (PSQI) for sleep quality assessment. Statistical analyses were performed using SPSS version 26. Pearson's correlation and multiple linear regression were applied to explore associations between variables ($p < 0.05$).

RESULTS: High academic stress was reported by 61.2% of participants, while 66.7% exhibited moderate to severe anxiety and 54.3% had depressive symptoms. Poor sleep quality was found in 78.1% of respondents (mean PSQI score: 8.3 ± 3.0). Academic stress showed a strong positive correlation with anxiety ($r = 0.61$), depression ($r = 0.57$), and sleep disturbances ($r = 0.48$). Regression analysis confirmed academic stress as a significant predictor of all three outcomes ($p < 0.001$).

CONCLUSION: The study highlights a high prevalence of mental health problems among medical students in Pakistan, primarily driven by academic stress. Institutional efforts toward stress management, counseling services, and academic reforms are imperative to promote healthier learning environments.

KEY TERMS: Academic Stress; Anxiety; Cross-Sectional Studies; Depression; Medical Students; Mental Health; Pakistan; Sleep Disorders

INTRODUCTION

Medical education is widely regarded as one of the most demanding academic pursuits, requiring long study hours, intense competition, and an enduring sense of responsibility toward future patients. These pressures frequently take a toll on the psychological well-being of medical students. Globally, high rates of anxiety, depression, and sleep disturbances among medical students have been consistently documented, and the situation in Pakistan appears particularly concerning given the additional sociocultural and institutional challenges faced by students. Recent studies highlight that the mental health of Pakistani medical students is declining at an alarming rate, raising serious questions about the sustainability of the current educational environment and its long-term implications on both professional competence and personal health. Evidence suggests that academic stress is a primary driver of psychological distress among medical students in Pakistan. The demanding nature of the MBBS curriculum, coupled with continuous examinations, limited recreational opportunities, and a competitive academic environment, creates a fertile ground for chronic stress. In a 2025 study at Army Medical College, Rawalpindi, over 87% of medical students reported academic stress, and 80% were identified as poor sleepers, establishing a significant association between academic stress and sleep disturbances (1). Similarly, earlier research at Combined Military Hospital Lahore found that nearly 60% of medical students experienced high stress, with 77% reporting poor sleep quality, suggesting that academic pressures not only elevate stress levels but also disrupt sleep cycles and overall mental stability (2).

Beyond sleep deprivation, the burden of anxiety and depression among medical students has reached critical proportions. A multi-institutional study from Karachi revealed that stress, anxiety, and depression were prevalent in almost all medical and nursing students surveyed, driven by factors such as fear of failure, heavy workloads, and family expectations (3). Likewise, in Peshawar, 19.4% of medical students were found to be clinically depressed, and over a quarter were at risk, underscoring the persistence of mental health issues despite institutional differences (4). These findings resonate with broader regional research linking academic pressures with deteriorating psychological health and diminished life satisfaction among students. The relationship between academic stress and mental health is multidimensional, with poor sleep quality often serving as a mediator between stress and emotional distress. Studies across various Pakistani medical institutions indicate that students with higher perceived stress scores report significantly worse sleep quality and a higher prevalence of depressive symptoms (5,6). Sleep deprivation itself exacerbates anxiety, cognitive fatigue, and academic underperformance, creating a cyclical relationship between stress and sleep dysfunction. Sleep disorders are not merely symptoms but active contributors to mental deterioration, as demonstrated by research linking poor sleep to heightened cardiovascular responses, reduced concentration, and increased emotional instability (7).

The psychosocial context of Pakistan further intensifies these issues. Family expectations, financial constraints, and limited access to psychological support contribute to students' vulnerability. A study conducted at Fatima Jinnah Medical University and other major institutions found that disturbed study-life balance, fear of an uncertain future, and an excessively demanding curriculum were leading causes of stress among medical students. Interestingly, most students reported relying on faith and religion as primary coping mechanisms rather than institutional counseling or peer support (8). This dependence on personal resilience rather than structured psychological aid highlights an institutional gap that continues to exacerbate the mental health burden. While the literature firmly establishes a high prevalence of anxiety, depression, and sleep disturbances among Pakistani medical students, the interconnected nature of these conditions and their direct association with academic stress remains underexplored through a comprehensive framework. Previous studies have treated these dimensions in isolation—examining stress, anxiety, or sleep separately—without fully assessing how they influence one another within the same academic and sociocultural ecosystem. Moreover, most existing research has focused on individual institutions or specific regions, limiting the generalizability of findings to the broader medical student population in Pakistan.

Given these gaps, the present research seeks to investigate the prevalence of anxiety, depression, and sleep disturbances among medical students in Pakistan and their association with academic stress, integrating psychological and behavioral dimensions within a unified framework. This study aims to provide empirical evidence that can inform institutional policies, mental health interventions, and academic reforms. By identifying the intensity and interrelations of these psychological outcomes, the research endeavors to highlight actionable insights for fostering healthier learning environments. The ultimate objective is to rationally assess how academic stress contributes to the mental health challenges faced by medical students in Pakistan and to propose data-driven strategies for prevention and early intervention.

METHODS

This cross-sectional analytical study was conducted over a period of eight months, from November 2022 to June 2023, across five medical colleges in Pakistan representing diverse geographical and institutional contexts. The participating institutions included King Edward Medical University (Lahore), Liaquat University of Medical and Health Sciences (Jamshoro), Khyber Medical College (Peshawar), Bolan Medical College (Quetta), and Rawalpindi Medical University (Rawalpindi). These colleges were selected to ensure representation from all major provinces and to capture regional variations in academic pressure and student well-being. The study sought to determine the prevalence of anxiety, depression, and sleep disturbances among undergraduate medical students and to assess their association with academic stress. The target population consisted of currently enrolled MBBS students from the first to final professional years. The sample size was calculated using OpenEpi software based on the findings of Waqas et al. (2015), who reported a 59.7% prevalence of high academic stress among Pakistani medical students (9). Using a 95% confidence interval, a 5% margin of error, and an expected prevalence (p) of 0.60, the calculated minimum sample size was 369. To accommodate potential non-responses, a 10% increment was applied, bringing the total required sample

size to 410 participants. A stratified random sampling technique was employed, with strata based on the year of study to ensure proportional representation of pre-clinical and clinical students. Inclusion criteria comprised medical students aged 18 to 26 years enrolled in MBBS programs at the selected institutions who consented to participate. Students with pre-diagnosed psychiatric illnesses, those currently on psychiatric medication, or those who had taken a leave of absence due to mental health issues in the preceding year were excluded to avoid confounding effects on outcome measures.

Data were collected using a self-administered online questionnaire distributed via institutional student email systems and social media groups under faculty supervision. The questionnaire was structured into five sections: (1) demographic profile, including age, gender, year of study, residence type, and daily study hours; (2) academic stress; (3) anxiety; (4) depression; and (5) sleep quality. The instruments selected were validated and widely used in mental health research. Academic stress was measured using the Perceived Stress Scale (PSS-14), which assesses the degree to which situations in life are appraised as stressful. Anxiety and depression were evaluated using the Depression Anxiety and Stress Scale (DASS-21), a reliable instrument for identifying emotional distress in non-clinical populations. Sleep quality was assessed through the Pittsburgh Sleep Quality Index (PSQI), which evaluates subjective sleep quality, latency, duration, efficiency, and disturbances over the previous month. All instruments demonstrated strong psychometric properties, with Cronbach's alpha coefficients exceeding 0.80 in previous studies conducted in Pakistani medical student populations (10). Prior to data collection, a pilot test involving 30 students from a non-participating medical college was conducted to ensure clarity, cultural relevance, and reliability of the questionnaire. The pilot data were excluded from the final analysis. Participants were informed about the objectives of the study, assured of anonymity and confidentiality, and asked to provide informed consent electronically before proceeding. Ethical approval was obtained from the Institutional Review Board (IRB) of King Edward Medical University, Lahore. Approval was also endorsed by the ethical committees of the collaborating institutions.

Data were entered and analyzed using IBM SPSS Statistics version 26. Continuous variables such as age, stress, anxiety, depression, and PSQI scores were presented as mean ± standard deviation (SD), while categorical variables such as gender, residence type, and year of study were reported as frequencies and percentages. The normality of data distribution was confirmed using the Shapiro–Wilk test. Descriptive statistics were followed by inferential analyses. To assess relationships between academic stress, anxiety, depression, and sleep quality, Pearson's correlation coefficient (r) was applied, given the normal distribution of data. Comparisons between categorical groups (e.g., gender, pre-clinical vs. clinical years) were evaluated using the independent samples t-test and one-way ANOVA as appropriate. The strength and direction of associations between academic stress (independent variable) and the outcome variables—anxiety, depression, and sleep disturbances—were further analyzed using multiple linear regression models. Statistical significance was set at $p < 0.05$. To maintain data quality and reduce bias, incomplete questionnaires were excluded during the data cleaning process, and double-entry verification was used to ensure accuracy. Confidentiality was strictly maintained by coding participant data numerically and restricting database access to the principal investigator. The study adhered to the ethical principles of the Declaration of Helsinki (2013 revision), ensuring respect, beneficence, and justice throughout the research process.

This methodological approach was designed to ensure rigor, reliability, and reproducibility. The selection of multiple validated psychological instruments allowed for a multidimensional assessment of the research objectives. The multi-center design increased the generalizability of findings to the broader population of medical students in Pakistan. Through systematic data collection, standardized measurements, and robust statistical analyses, this study aimed to establish clear empirical relationships between academic stress, anxiety, depression, and sleep quality—thereby providing evidence-based insights to guide policy interventions and student mental health initiatives within medical education frameworks in Pakistan.

RESULTS

A total of 410 medical students from five medical institutions across Pakistan participated in the study, yielding a response rate of 92.7%. Among these, 254 (62.0%) were female and 156 (38.0%) were male, with a mean age of 21.4 ± 1.8 years. The sample included 46.1% pre-clinical and 53.9% clinical students. The majority (71.7%) resided in hostels, while 28.3% lived at home. The mean Perceived Stress Scale (PSS-14) score was 29.8 ± 6.5, indicating a high prevalence of academic stress across the cohort. Based on standardized cut-off points, 61.2% of students experienced high stress, 28.4% moderate stress, and 10.4% low stress. The mean Depression Anxiety and Stress Scale (DASS-21) subscale scores were 14.2 ± 6.3 for anxiety and 16.5 ± 7.1 for depression. Moderate to severe anxiety was identified in 66.7% of respondents, and moderate to severe depression in 54.3%.

Sleep quality, measured through the Pittsburgh Sleep Quality Index (PSQI), demonstrated a mean global score of 8.3 ± 3.0. Based on the PSQI cut-off (≥5 indicating poor sleep), 78.1% of students were classified as poor sleepers. Mean sleep duration was 5.7 ± 1.1 hours per night, and 64.6% reported using caffeine or stimulants to manage wakefulness before examinations. Gender-based comparisons revealed that female students had significantly higher mean anxiety (15.4 ± 6.0 vs. 12.1 ± 6.3, $p = 0.002$) and depression scores (17.2 ± 7.0 vs. 15.2 ± 6.8, $p = 0.04$) compared to males. Year-wise analysis indicated that final-year students exhibited the highest stress levels (mean PSS = 31.6 ± 6.1), followed by third-year students (30.8 ± 6.3), while first-year students reported relatively lower stress (27.4 ± 6.9, $p = 0.01$).

Pearson's correlation analysis showed a strong positive correlation between academic stress and anxiety ($r = 0.61$, $p < 0.001$), stress and depression ($r = 0.57$, $p < 0.001$), and stress and poor sleep quality ($r = 0.48$, $p < 0.001$). Regression analysis confirmed

that academic stress significantly predicted anxiety (β = 0.59, $p < 0.001$), depression (β = 0.51, $p < 0.001$), and PSQI scores (β = 0.42, $p = 0.002$), even after controlling for age, gender, and year of study.

Table 1. Demographic Characteristics of Participants (n = 410)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	156	38.0
	Female	254	62.0
Year of Study	Pre-clinical	189	46.1
	Clinical	221	53.9
Residence	Hostel	294	71.7
	Home	116	28.3

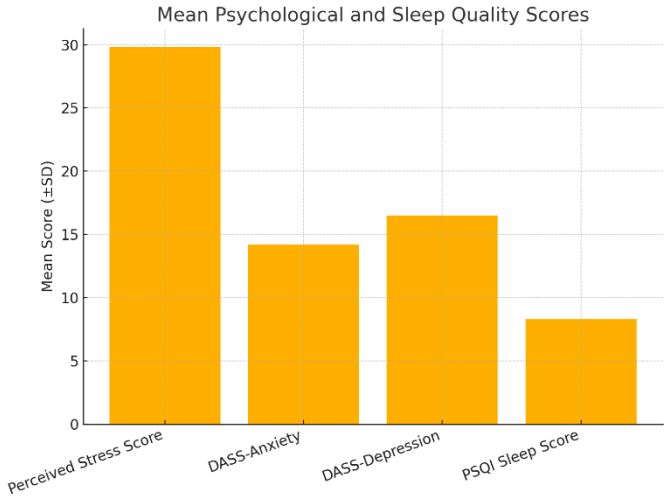
Table 2. Mean Scores of Psychological and Sleep Variables

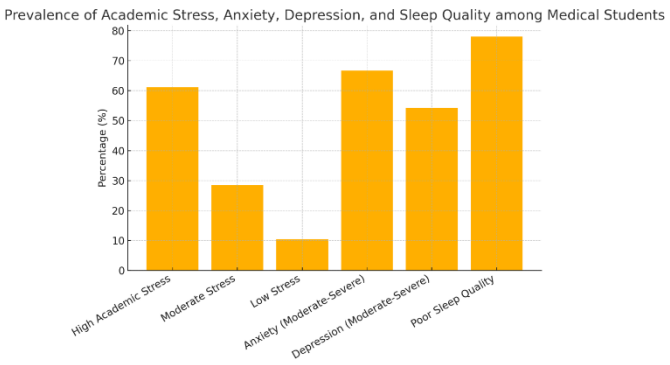
Variable	Mean ± SD	Range	Interpretation
Perceived Stress Scale (PSS-14)	29.8 ± 6.5	12–49	High Stress
DASS-Anxiety	14.2 ± 6.3	2–34	Moderate
DASS-Depression	16.5 ± 7.1	3–38	Moderate
PSQI Global Score	8.3 ± 3.0	2–18	Poor Sleep Quality

Table 3. Correlation between Academic Stress and Psychological Outcomes

Variable Pair	Correlation Coefficient (r)	p-value	Strength
Stress–Anxiety	0.61	<0.001	Strong
Stress–Depression	0.57	<0.001	Moderate
Stress–Sleep Quality	0.48	<0.001	Moderate

Overall, the results demonstrated a high prevalence of academic stress and poor psychological health among Pakistani medical students, with clear statistical associations among stress, anxiety, depression, and disturbed sleep. The relationship was consistent across genders and academic years, confirming the pervasive impact of academic demands on mental well-being within this population.





DISCUSSION

The findings of the present study revealed a strikingly high prevalence of psychological distress and sleep disturbances among medical students across Pakistan, confirming that academic stress remains a dominant determinant of mental health deterioration

in this population (11). More than sixty percent of the participants experienced high levels of perceived stress, nearly two-thirds reported moderate to severe anxiety, and over half were affected by depressive symptoms. Additionally, approximately seventy-eight percent demonstrated poor sleep quality, reflecting a profound impact of academic pressures on students' overall well-being (12). These findings provide compelling evidence that the intensity of medical education in Pakistan continues to exert an adverse psychological burden, consistent with national and regional patterns observed in comparable academic environments (13). The observed mean Perceived Stress Scale score of 29.8 ± 6.5 aligns closely with previous national data, where stress levels among medical students ranged from moderate to high. Studies conducted in Rawalpindi and Lahore have reported prevalence rates of academic stress between 59% and 70%, accompanied by similarly elevated sleep disturbance rates. The current results further substantiate these observations, with strong correlations found between stress, anxiety, and sleep quality ($r = 0.61$, $r = 0.48$ respectively, $p < 0.001$). This reinforces the conceptual understanding that stress acts not only as a direct psychological strain but also as a catalyst for emotional dysregulation and disturbed sleep architecture. In clinical terms, chronic academic stress likely alters cortisol rhythms and disrupts circadian balance, contributing to persistent sleep inefficiency and fatigue, both of which perpetuate psychological distress (14).

Anxiety and depression were found to be widespread among medical students in the current study, with mean DASS scores of 14.2 ± 6.3 and 16.5 ± 7.1 respectively. These results correspond to findings from large-scale studies across medical institutions in Karachi and Peshawar, where more than half of students were found to have moderate-to-severe anxiety and depressive symptoms. The consistent pattern across provinces implies that structural aspects of medical education in Pakistan—such as continuous examinations, limited psychological support, and high parental expectations—are likely contributing factors (15). The higher prevalence among female students observed in this study mirrors trends reported globally, where gender-based differences in emotional processing, social roles, and coping strategies contribute to greater susceptibility to anxiety and depressive disorders. The high mean PSQI score (8.3 ± 3.0) and the fact that almost four out of five students were classified as poor sleepers underscore the extent to which sleep disturbances accompany academic stress in medical education. Earlier local research indicated comparable findings, where between 70% and 80% of students demonstrated suboptimal sleep quality, highlighting an endemic problem (16). It is plausible that excessive screen time, erratic study schedules, and examination-related anxiety exacerbate sleep deprivation. The physiological consequences of chronic poor sleep extend beyond academic underperformance, potentially impairing cardiovascular health and cognitive function, as reported in previous investigations among South Asian medical populations (17).

The correlation analysis in this study established significant positive associations between academic stress and all measured mental health outcomes, confirming a direct and measurable relationship. Multiple regression analysis demonstrated that stress predicted anxiety, depression, and sleep disturbance independently of demographic factors. This statistical relationship underscores the interconnected nature of psychological morbidity in high-pressure educational environments. The results imply that academic stress functions as a unifying etiological factor linking emotional and physiological dimensions of student health (18). The implications of these findings are multifaceted. At an institutional level, the data emphasize the urgent need for integrating structured mental health support services within medical universities (19). The current educational climate in Pakistan prioritizes academic excellence over psychological resilience, which may inadvertently foster burnout, decreased empathy, and compromised future clinical performance. The introduction of stress-management workshops, mentorship programs, and accessible counseling services could mitigate the negative trajectory observed in this study. Additionally, policy-level interventions—such as balanced assessment schedules, enforced rest periods, and student welfare frameworks—may contribute to healthier learning environments (20).

While the study demonstrated methodological strength through its multi-center design, representative sampling, and use of validated psychometric instruments, certain limitations must be acknowledged. The cross-sectional nature of the research restricted the ability to infer causality between academic stress and mental health outcomes. Longitudinal studies would be required to examine whether these psychological disturbances persist or fluctuate across academic years. Moreover, although the sample was geographically diverse, self-reported data inherently carry risks of response bias, as participants may underreport emotional symptoms due to stigma or social desirability (21). The exclusion of students with pre-diagnosed psychiatric conditions, while methodologically justified, may have slightly underestimated the true prevalence of distress within the broader student population. Despite these limitations, the study's strengths include its large sample size, high response rate, and the use of standardized scales with strong internal reliability. By simultaneously assessing academic stress, anxiety, depression, and sleep quality, the research provides an integrated perspective rarely captured in local literature. Furthermore, the inclusion of both pre-clinical and clinical students allowed for comparison across academic stages, revealing that senior students experienced significantly greater psychological burden. This finding points to the cumulative nature of stress throughout medical training, warranting targeted early intervention during the initial years of study.

Future research should explore longitudinal trajectories of stress-related disorders among medical students, particularly in relation to coping mechanisms and academic outcomes. Interventional studies examining the efficacy of structured mental health programs, mindfulness training, and curriculum modifications would be instrumental in developing evidence-based policy solutions. Additionally, qualitative inquiries into cultural and gender-specific factors influencing help-seeking behaviors could enrich the understanding of barriers to mental health care among medical trainees. The results of this study reaffirm that anxiety, depression, and sleep disturbances are alarmingly prevalent among Pakistani medical students and are strongly associated with academic stress. The data highlight the pressing need for systemic reform in medical education to safeguard psychological health,

enhance academic performance, and promote long-term professional well-being. By addressing these concerns through evidence-based interventions, educational institutions can foster a more sustainable and humane environment for the physicians of tomorrow.

CONCLUSION

The study concluded that anxiety, depression, and sleep disturbances are highly prevalent among medical students in Pakistan and are significantly associated with academic stress. These findings highlight the urgent need for integrating structured mental health support, stress-management interventions, and institutional policy reforms within medical education. Addressing academic stress through preventive and supportive strategies can substantially enhance students' psychological well-being, academic performance, and long-term professional resilience.

AUTHOR's CONTRIBUTION:

Author	Contribution
Ruqia Safdar Bajwa	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision

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