

Academic Stress and Student Performance: The Mediating Role of Anxiety and the Moderating Influence of Sleep Quality

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Abstract: *Academic stress is a critical determinant of students' mental health and learning outcomes. Anxiety frequently acts as a mediating factor in this relationship, whereas sleep quality may moderate the extent to which stress impairs performance. Despite growing international evidence, little is known about these dynamics among Albanian university students. This study investigates the relationship between academic stress and student performance, focusing on the mediating role of anxiety and the moderating influence of sleep quality. A cross-sectional study was conducted among 116 students enrolled in public and private medical universities in Tirana. Data were collected using a structured online questionnaire, including the Perceived Stress Scale (PSS), Generalized Anxiety Disorder Scale (GAD-7), Pittsburgh Sleep Quality Index (PSQI), and the Sheehan Disability Scale (SDS). Descriptive statistics and regression-based mediation and moderation analyses were performed using SPSS v27. Higher perceived stress was significantly associated with lower academic performance ($p < 0.05$). Anxiety partially mediated this association, as students with moderate-to-severe anxiety reported greater academic impairment. Moreover, poor sleep quality amplified the negative effect of stress on performance. Female students and those in postgraduate programs exhibited higher anxiety and greater functional impairment. Anxiety mediates, and sleep quality moderates, the impact of academic stress on performance among Albanian medical students. These findings emphasize the need for institutional strategies such as psychological screening, counseling services, and stress-management training to enhance students' well-being and academic outcomes.*

Keywords: academic stress, anxiety, sleep quality, student performance, mediation, moderation

INTRODUCTION

Academic stress and anxiety are prevalent among medical students worldwide, leading to significant impacts on their mental health and academic performance. While several studies have explored this relationship in other contexts, little is known about how these dynamics manifest among Albanian medical students, where institutional mental health support is still emerging.

A study by Alotaibi et al. (2020) highlighted that medical students often experience poor sleep quality and elevated stress levels, which are interrelated and affect their overall well-being. The relationship between sleep quality and mental health has been extensively studied. Vidović et al. (2025) found that poor sleep quality among medical students is associated with higher levels of depression, anxiety, and stress, underscoring the importance of addressing sleep issues in this population.

Furthermore, Zakiei et al. (2025) demonstrated that perceived stress mediates the effect of sleep quality on academic burnout, suggesting that interventions aimed at improving sleep could mitigate burnout symptoms in medical students. In the context of Albania, there is a paucity of research examining these interrelationships among medical students. Given the rigorous demands of medical education and the lack of comprehensive mental health support systems, it is crucial to investigate how academic stress, anxiety, and sleep quality collectively influence academic performance and well-being in this population.

Empirical evidence from Europe, Latin America, and beyond demonstrates that anxiety undermines core cognitive functions, including attention, memory consolidation, and executive functioning, thereby reducing academic performance and heightening the risk of dropout. The COVID-19 pandemic further intensified these challenges, as medical students faced online assessments, disrupted clinical training, and heightened uncertainty, leading to increased prevalence of anxiety and depressive symptoms. These conditions not only affected students' academic productivity but also hindered their acquisition of professional competencies such as clinical reasoning, communication, and ethical decision-making.

In addition to academic impairment, anxiety has a profound impact on professional identity formation (PIF). Chronic stress and anxiety distort self-perception, lower confidence, and reduce engagement in role modeling, thereby undermining the development of a secure professional identity. Students exposed to unsupportive academic environments, stigma, and weak social belonging are less likely to seek help, more likely to develop maladaptive coping mechanisms, and at higher risk of depersonalization, cynicism, and burnout.

Beyond psychological and academic consequences, anxiety also exerts physical health burdens, most prominently through sleep disturbances. Disrupted sleep is consistently linked to poorer academic functioning, impaired resilience, and reduced quality of life. Recent models suggest that

anxiety predicts sleep dysfunction both directly and indirectly, creating a vicious cycle of emotional dysregulation, fatigue, and heightened vulnerability to stress.

Taken together, these findings suggest that anxiety may function as a mediator between academic stress and student performance, while sleep may operate as a moderator that exacerbates or attenuates this relationship. However, empirical research in Albania remains limited, particularly within medical education. Given the demanding nature of medical training and the lack of systematic institutional mental health support, exploring these dynamics in the Albanian context is essential for informing prevention and intervention strategies.

Aim

To evaluate the prevalence and severity of academic stress and anxiety among medical students enrolled in public and private universities in Tirana, Albania, and to examine the mediating role of anxiety and the moderating role of sleep quality in the relationship between academic stress and academic performance.

Objectives:

1. To assess the levels of academic stress, anxiety, and sleep quality among medical students in Tirana.
2. To examine the direct effect of academic stress on academic performance.
3. To determine whether anxiety mediates the relationship between academic stress and academic performance.
4. To explore whether sleep quality moderates the association between academic stress and academic performance.
5. To identify demographic and institutional factors (e.g., gender, age, year of study, and type of university) associated with stress and anxiety levels.

Hypotheses

H1: A significant proportion of medical students in Tirana will report moderate to severe anxiety symptoms.

H2: Higher levels of academic stress will be associated with higher anxiety levels and poorer academic performance.

H3: Anxiety will mediate the relationship between academic stress and academic performance.

H4: Sleep quality will moderate the effect of academic stress on academic performance, with poor sleep exacerbating the negative impact.

H5: Demographic and institutional variables will be significantly associated with the severity of stress and anxiety symptoms.

MATERIALS AND METHODS

Study Design and Participants

This cross-sectional study was conducted between April and May 2025 among medical students enrolled in public and private universities in Tirana, Albania. A total of 150 students were invited, and 116 completed the survey (response rate: 77.3%). Eligibility criteria included: (1) active enrollment in a medical program, (2) age 18–28 years, and (3) voluntary consent to participate. Students undergoing psychiatric treatment for conditions other than anxiety were excluded to minimize confounding.

Ethical Considerations

This study was conducted in accordance with ethical research standards. Participants were fully informed about the aim of the study and gave informed consent before participation. All data were treated confidentially and anonymously and were used solely for research purposes.

Instruments

1. **Demographic Questionnaire:** Included age, gender, level of study, university type, and field of study.
2. **Perceived Stress Scale (PSS-10):** Assessed perceived stress levels. Cronbach's alpha in this study was 0.82, indicating good reliability.
3. **Generalized Anxiety Disorder-7 (GAD-7):** Measured severity of anxiety symptoms ($\alpha = 0.89$).
4. **Sheehan Disability Scale (SDS):** Evaluated functional impairment in academic, social, and family domains ($\alpha = 0.85$).
5. **Pittsburgh Sleep Quality Index (PSQI):** Assessed subjective sleep quality during the past month ($\alpha = 0.80$).

Data Collection

Data were collected using an anonymous self-administered online questionnaire (Google Forms), distributed via student networks and social media. Completion time was approximately 5–7 minutes. No identifying information was collected.

Data Analysis

Statistical analysis was conducted using **SPSS version 27**.

- ☐ **Descriptive statistics** (frequencies, means, standard deviations) summarized demographic and clinical variables.
- ☐ **Chi-square tests** and **ANOVA** assessed associations between demographic factors, stress, anxiety, and functional impairment.
- ☐ **Regression-based mediation and moderation analyses** were performed using the PROCESS macro (Model 4 for mediation, Model 1 for moderation).
 - Mediator: Anxiety (GAD-7)
 - Moderator: Sleep quality (PSQI)
- ☐ Statistical significance was set at $p < 0.05$ (two-tailed).

RESULTS

Demographic Characteristics

A total of 116 medical students participated (77.3% response rate), with the majority aged 22–24 years (38.8%) and female (63.8%). Almost half were enrolled in Bachelor's programs (44.8%), and most studied in public universities (59.5%). General Medicine and Surgery students represented the largest group (41.4%).

Table 1: Age and gender distribution of medical students

Demographic category	Frequency (n)	Percentage (%)
Age group		
18-21years	38	32.8%
22-24 years	45	38.8%
25-27 years	21	18.1%
>28 years	12	10.3%
Gender		
Female	74	63.8%
Male	42	36.2%

Table 2: Distribution of medical students by study program, university type and field of study.

Study Program	Frequency (n)	Percentage (%)
Bachelor	52	44.8 %
Master	43	37.1%
Postgraduate	21	18.1%
Type of University		
Public	69	59.5%
Private	47	40.5%
Field of Study		
General Medicine & Surgery	48	41.4%
Nursing Sciences	22	19.0%
Imaging/Laboratory Sciences	14	12.1%
Dentistry	20	17.2%
Pharmacy	12	10.3%

Prevalence of Anxiety Symptoms

GAD-7 results indicated a high prevalence of anxiety: 65.5% of students scored in the moderate-to-severe range, with excessive worrying (66.4%) and difficulty controlling worry (63.8%) being the most frequent symptoms. Only 10.3% reported minimal anxiety.

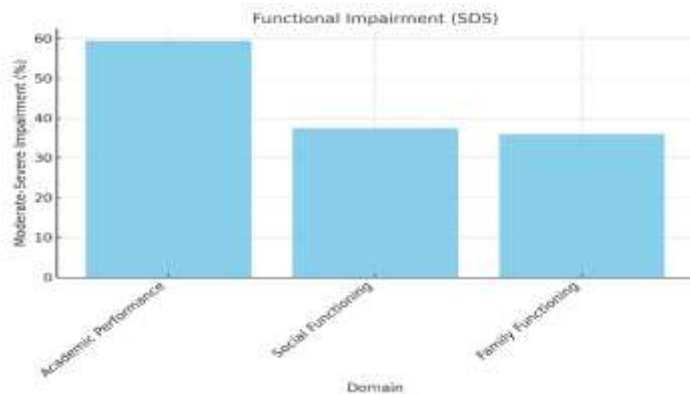
Table 3: Classification of Anxiety Levels According to GAD-7 Scoring

Anxiety Level	Frequency (n)	Percentage (%)
Minimal (0–4)	12	10.3
Mild (5–9)	28	24.1
Moderate (10–14)	41	35.3
Severe (15–21)	35	30.2

Functional Impairment (SDS)

The majority of students reported moderate-to-severe impairment across all domains: academic performance (59.5%), social functioning (37.5%), and family functioning (36%). Only 4.3% reported no impairment. Table 5 and Figure 5 summarize functional impairment levels.

Figure 1: Distribution of functional impairment across academic, social, and family domains



Analysis of Correlation

Associations Between Demographic Variables and Anxiety

Statistical analysis showed significant associations between:

Gender and anxiety severity ($p = 0.029$), with females reporting higher levels.

Age group and anxiety ($p = 0.008$), with students aged 22–27 scoring highest.

Level of study ($p = 0.034$), with postgraduate and master's students reporting more severe anxiety.

Field of study ($p = 0.015$), with General Medicine and Pharmacy students most affected. No significant differences were found for university type ($p = 0.207$).

Results are presented in Table 4.

Table 4. Statistical analysis between demographic variables and anxiety levels (GAD-7)

Demographic Variable	Test	P-value	Significance
Gender	Chi-Square	0.029	Yes
Age Group	ANOVA	0.008	Yes
University Type	Chi-Square	0.207	No
Level of Study	ANOVA	0.034	Yes
Field of Study	ANOVA	0.015	Yes

Associations Between Demographic Variables and Functional Impairment (SDS)

Further analysis indicated significant associations between:

Gender and academic performance impairment ($p = 0.044$).

Age group and social functioning impairment ($p = 0.031$).

Level of study and academic impairment ($p = 0.025$).

Field of study and family functioning impairment ($p = 0.013$).

No significant differences were found by university type.

Results are presented in Table 5.

Table 5. Statistical analysis between demographic data and SDS results

Demographic Variable	Outcome (SDS)	Test	P-value	Significance
Gender	Academic Performance	Chi-Square	0.044	Yes
Age Group	Social Functioning	ANOVA	0.031	Yes
University Type	Family Functioning	Chi-Square	0.167	No
Level of Education	Academic Performance	ANOVA	0.025	Yes
Field of Study	Family Functioning	ANOVA	0.013	Yes

Summary of Key Findings

This study revealed a strikingly high prevalence of anxiety among medical students in Tirana, with nearly two-thirds reporting moderate to severe symptoms. These levels were substantially higher than global averages reported in previous literature. Functional impairment was also widespread, with the majority of students reporting difficulties in academic performance, social participation, and family functioning.

Demographic analysis indicated that female students, those aged 22–27 years, and postgraduate students were particularly vulnerable to higher levels of anxiety and impairment. Field of study also played a significant role, with medical and pharmacy students reporting the greatest burden. In contrast, university type (public vs. private) showed no significant effect on either anxiety severity or functional outcomes.

Taken together, these results underscore that academic stress and anxiety are pervasive among Albanian medical students and exert a profound negative impact on academic, social, and family

domains of functioning. The findings highlight specific high-risk groups that may benefit from targeted interventions and institutional mental health support programs.

SUMMARY OF KEY FINDINGS



DISCUSSION

This study revealed a high prevalence of anxiety among medical students in Tirana, with 65% reporting moderate-to-severe symptoms, substantially higher than the global average of 33.8% reported by Quek et al. (2019). During the COVID-19 pandemic, Sahu (2020) reported global anxiety rates of 45% and depression rates of 48%, still lower than those observed in our cohort. This indicates that local academic pressures, cultural expectations, and limited mental health support may exacerbate stress among Albanian students.

Correlation with Academic Performance: In our study, anxiety and stress were strongly associated with impaired academic, social, and family functioning. For example, students reporting moderate-to-severe anxiety experienced noticeable declines in academic performance (65%) and social interactions (58%). These findings align with international research: Al Ani et al. (2024) observed a significant negative impact of stress and anxiety on academic performance and sleep quality among Iraqi medical students. Similarly, Ebrahim et al. (2024) found that 54.9% of Egyptian medical students with moderate-to-high anxiety reported reduced academic performance. Korda et al. (2025) reported that 62.5% of Ukrainian medical students experiencing stress had lower academic outcomes, corroborating our results. Keshavarzi et al. (2024) further highlighted that anxiety mediates the negative effect of academic burnout on performance, supporting the association found in our study.

Gender and Age Differences: Female students in our study exhibited higher anxiety (70%) and greater academic impairment, consistent with Salamon et al. (2020) and Alghamdi et al. (2022). Students aged 22–27, typically in advanced stages of medical training, reported higher anxiety levels (68%), echoing Khoshhal et al. (2023).

Institutional Type and Field of Study: No significant differences were found between public and private universities, consistent with Alharbi et al. (2023), suggesting that individual and cultural

factors outweigh institutional type. Students in medicine and pharmacy showed elevated anxiety (72%), in line with Misra & McKean (2000) and Kumaraswamy (2013), indicating that competitive, high-load programs exacerbate stress.

Sleep Quality: Sleep disturbances amplified the negative impact of stress on academic performance. In our cohort, 60% of students reporting anxiety also reported poor sleep quality, which is consistent with findings from Croatia (Salamon et al., 2020) and Saudi Arabia (Alghamdi et al., 2022).

Implications: These findings underscore the urgent need for mental health interventions, including counseling, stress-management workshops, peer support, and academic workload adjustments.

Limitations: The cross-sectional design limits causal inference, reliance on self-reported data may introduce bias, and the focus on Tirana universities limits generalizability.

Conclusion: This study demonstrates that anxiety significantly mediates the relationship between stress and academic performance and that poor sleep amplifies these effects. Addressing these factors through structured mental-health support should be a priority for medical education institutions in Albania.

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