

Male Mental Health Among Medical Students at ANMC Lahore: A Cross-Sectional Study-

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Abstract

Background: Depression is highly prevalent among university students globally, with medical students identified as a particularly vulnerable group. Sociodemographic and lifestyle factors, including financial dependence and smoking, are proposed risk factors for depressive symptoms, yet their roles remain underexplored among male medical students in Pakistan.

Objective: To assess the prevalence and predictors of depressive symptoms among male medical students at ANMC, a constituent college of Superior University, Lahore.

Methods: This cross-sectional analytical study included 312 male undergraduate medical students aged ≥ 18 years. Data were collected using a self-administered questionnaire, including

sociodemographic/lifestyle variables and the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms (cut-off: PHQ-9 ≥ 5). Bivariate and multivariate logistic regression analyses were performed to identify independent predictors.

Results: The prevalence of depressive symptoms was 75.3%. Financial dependence (AOR = 2.92; 95% CI: 1.41–6.05) and partial financial independence (AOR = 3.64; 95% CI: 1.38–9.62) were associated with higher odds of depressive symptoms compared to full financial independence. Smokers had significantly greater odds of depressive symptoms compared to non-smokers (AOR = 0.22; 95% CI: 0.08–0.59 for non-

smokers). No significant associations were observed for year of study, marital status, student residency, parental education, or physical activity after adjustment.

Conclusion: There is a strikingly high prevalence of depressive symptoms among male medical students in this setting. Financial dependence and smoking were independent predictors of depression. Targeted mental health interventions, financial counseling, and smoking cessation programs are recommended to address these risk factors.

INTRODUCTION

Depression is a leading contributor to global disease burden, affecting more than 280 million people worldwide (1). University students, and particularly those enrolled in medical programs, are recognized as a population at elevated risk for mental health problems due to academic, social, and financial pressures (2,3). Emerging adulthood, characterized by transitions in autonomy and responsibility, may further heighten susceptibility to depressive symptoms among university-aged males (4).

Numerous studies have documented a high prevalence of depressive symptoms among medical students globally, with rates often exceeding those seen in the general population (5). Medical training is frequently accompanied by high academic demands, competitive environments, and exposure to distressing clinical experiences, all of which may contribute to psychological distress and depressive symptomatology (6). Notably, male medical students may experience unique barriers to seeking psychological support, including cultural norms around masculinity, perceived stigma, and reluctance to disclose mental health concerns (7).

Sociodemographic and lifestyle factors, such as financial dependence and smoking, have also been implicated as potential risk factors for depressive symptoms among students (8,9). Financial stress can undermine psychological well-being and academic performance, particularly in contexts where family expectations are high and resources are limited (4). Additionally, smoking has been consistently associated with greater psychological distress and is thought to reflect both maladaptive coping and increased vulnerability to depression (9).

Despite increasing recognition of student mental health as a public health priority, data on depressive symptoms among **male medical students in Pakistan remain limited**, and the specific roles of financial dependence and smoking are underexplored. Understanding these associations is crucial for informing targeted interventions and support services within university settings.

Therefore, the present study aimed to examine the prevalence and predictors of depressive symptoms among male medical students at ANMC a constituent college of Superior University.

METHODS

STUDY DESIGN AND SETTING

A cross-sectional analytical study was conducted at ANMC a constituent college of Superior University, Lahore, Pakistan. The study protocol was reviewed and approved by the Institutional Review Board of Superior University. All procedures conformed to the principles of the Declaration of Helsinki.

STUDY POPULATION AND SAMPLING

INCLUSION CRITERIA WERE:

1. Male students enrolled in the undergraduate medical program (MBBS) at ANMC a constituent college of Superior University during the 2023–2024 academic year.

2. Aged 18 years or older.
3. Provided informed written consent.

EXCLUSION CRITERIA included:

1. Students unwilling or unable to complete the questionnaire.
2. Students with self-reported previous diagnosis of major psychiatric illness other than depression (to reduce confounding).

SAMPLING METHOD

A census sampling approach was used. All eligible male undergraduate medical students were invited to participate. 312 students consented and completed the survey

DATA COLLECTION

Data collection occurred between January 2024. An anonymous, self-administered structured questionnaire was distributed in lecture halls and common area. Participation was voluntary, and no incentives were provided.

MEASURES**1. SOCIODEMOGRAPHIC AND LIFESTYLE VARIABLES**

Collected variables included:

- **Age (years)**
- **Year of study** (1st to 5th year)
- **Marital status** (single/married)
- **Type of student** (boarder/day scholar)
- **Parental education level** (high school or below, bachelor's degree, master's or higher)
- **Financial status** (financially dependent, partially independent, fully independent)
- **Smoking status** (smoker/non-smoker; based on self-report of current smoking)

- **Physical activity level** (active, moderate, sedentary; assessed via self-report using standard definitions as per WHO guidelines)

2. ASSESSMENT OF DEPRESSIVE SYMPTOMS

Depressive symptoms were assessed using the **Patient Health Questionnaire-9 (PHQ-9)**, a validated and widely used screening instrument for depression (11). The PHQ-9 contains nine items rated on a 4-point Likert scale (0=not at all to 3=nearly every day), with total scores ranging from 0 to 27.

- **Depressive symptoms** were defined as a PHQ-9 score ≥ 5 , in line with established cut-offs. (12)
- The instrument demonstrated high internal consistency in this sample (Cronbach's alpha = 0.85).

ETHICAL CONSIDERATIONS

Participation was voluntary. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were ensured by using unique codes and not collecting identifying information. Students identified as having moderate or severe depressive symptoms (PHQ-9 ≥ 10) were provided with information on university counseling services.

STATISTICAL ANALYSIS

Data were entered and analyzed using IBM SPSS Statistics, version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to summarize participant characteristics.

- **Continuous variables** were reported as means and standard deviations (SD); **categorical variables** as frequencies and percentages.
- **Bivariate analyses:** Associations between depressive symptoms (PHQ-9 ≥ 5 vs. < 5) and categorical independent variables were assessed using Pearson's chi-square tests.

- **Multivariate analysis:** Variables with $p < 0.20$ in bivariate analysis or theoretical relevance were included in a multivariate logistic regression model to identify independent predictors of depressive symptoms. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported.
- **Model fit** was evaluated using the Hosmer-Lemeshow goodness-of-fit test, and explained variance was quantified by Cox & Snell and Nagelkerke R^2 .

All statistical tests were two-tailed, with $p < 0.05$ considered statistically significant.

RESULTS

SAMPLE CHARACTERISTICS

A total of 312 male undergraduate students participated in the study. The mean age was 22.3 years (SD = 1.8; range 18–28). The majority of participants were single (95.2%). Student residency was nearly evenly split, with 51.0% living in dormitories (boarders) and 49.0% as day scholars. Most students' parents held at least a bachelor's degree (78.8%). The majority were financially dependent (67.9%), 16.7% reported being current smokers, and 25.0% were classified as physically active.

There were no missing data for sociodemographic or outcome variables; all analyses were conducted on complete cases.

TABLE 1. SOCIODEMOGRAPHIC AND LIFESTYLE CHARACTERISTICS OF MALE STUDENTS (N = 312)

Variable	Category	n	%
Age (years)	Mean (SD): 22.3 (1.8); Range: 18–28		
Year of Study	1	24	7.7
	2	51	16.3
	3	41	13.1
	4	159	51.0

	5	37	11.9
Marital Status	Single	297	95.2
	Married	15	4.8
Student Type	Boarder	159	51.0
	Day scholar	153	49.0
Parental Education	High school or below	66	21.2
	Bachelor's degree	139	44.6
	Master's or higher	107	34.3
Financial Status	Financially dependent	212	67.9
	Partially independent	54	17.3
	Fully independent	46	14.7
Smoking Status	Non-smoker	260	83.3
	Smoker	52	16.7
Physical Activity	Active	78	25.0
	Moderate	177	56.7
	Sedentary	57	18.3

PREVALENCE OF DEPRESSIVE SYMPTOMS

The mean total PHQ-9 score among participants was 8.85 (SD = 5.67; range: 0–26). Using established cut-off values (PHQ-9 score ≥ 5), **235 students (75.3%) were classified as having depressive symptoms**, while 77 students (24.7%) were classified as having none. The distribution of PHQ-9 total scores is illustrated in Figure 1.

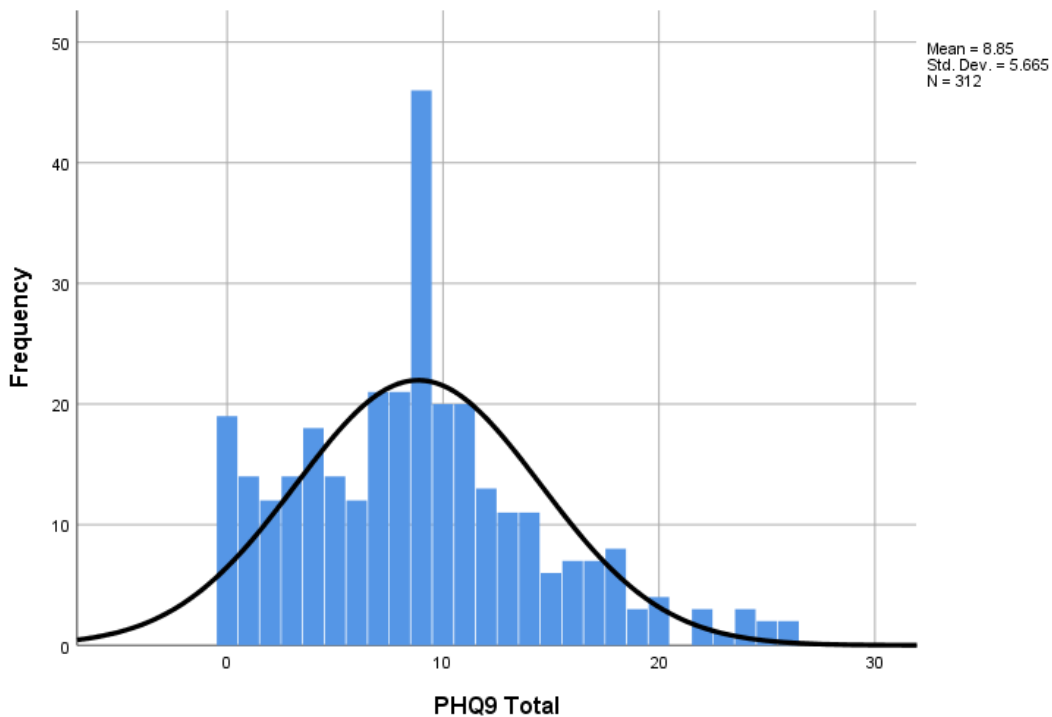


FIGURE 1.HISTOGRAM OF PHQ-9 TOTAL SCORES AMONG MALE UNDERGRADUATE STUDENTS (N = 312).

TABLE 2. PREVALENCE OF DEPRESSIVE SYMPTOMS AMONG MALE STUDENTS (PHQ-9 CATEGORIES; N = 312)

PHQ-9 Category	n	%
None (0–4)	77	24.7
Depressive (5–27)	235	75.3

RELIABILITY OF THE PHQ-9

The PHQ-9 demonstrated high internal consistency in this sample (Cronbach’s alpha = 0.85).

ASSOCIATIONS BETWEEN DEPRESSIVE SYMPTOMS AND STUDENT CHARACTERISTICS

Bivariate analyses using chi-square tests were performed to examine associations between depressive symptoms and sociodemographic/lifestyle factors (Table 3). **Financial status, smoking status, and physical activity level were significantly associated with depressive symptoms.** Specifically:

- **Financial Status:** Financially dependent and partially independent students had a higher prevalence of depressive symptoms compared to fully independent students ($\chi^2 = 8.98$, $p = .011$).
- **Smoking Status:** A greater proportion of smokers reported depressive symptoms compared to non-smokers ($\chi^2 = 5.80$, $p = .016$).
- **Physical Activity:** Sedentary students had a higher prevalence of depressive symptoms compared to those who were physically active ($\chi^2 = 7.18$, $p = .028$).

No significant associations were observed for year of study ($p = .749$), marital status ($p = .426$), student type ($p = .076$), or parental education level ($p = .219$).

TABLE 3. BIVARIATE ASSOCIATIONS BETWEEN STUDENT CHARACTERISTICS AND DEPRESSIVE SYMPTOMS (N = 312)

Variable	Category	None (%)	n	Depressive (%)	n	χ^2	p-value
Year of Study	1	8 (10.4)	16	6 (6.8)	16	1.93	0.749
	2	11 (14.3)	40	17 (17.0)	40		
	3	8 (10.4)	33	14 (14.0)	33		
	4	41 (53.2)	118	50 (50.2)	118		
	5	9 (11.7)	28	11 (11.9)	28		
Marital Status	Single	72 (93.5)	225	95 (95.7)	225	0.64	0.426

	Married	5 (6.5)	10 (4.3)		
Student Type	Boarder	46 (59.7)	113 (48.1)	3.15	0.076
	Day scholar	31 (40.3)	122 (51.9)		
Parental Education	Master's or higher	30 (39.0)	77 (32.8)	3.04	0.219
	Bachelor's degree	36 (46.8)	103 (43.8)		
	High school or below	11 (14.3)	55 (23.4)		
Financial Status	Financially dependent	49 (63.6)	163 (69.4)	8.98	0.011*
	Partially independent	9 (11.7)	45 (19.1)		
	Fully independent	19 (24.7)	27 (11.5)		
Smoking Status	Non-smoker	71 (92.2)	189 (80.4)	5.80	0.016*
	Smoker	6 (7.8)	46 (19.6)		
Physical Activity	Active	28 (36.4)	50 (21.3)	7.18	0.028*
	Moderate	36 (46.8)	141 (60.0)		
	Sedentary	13 (16.9)	44 (18.7)		

*Statistically significant at $p < .05$

MULTIVARIATE LOGISTIC REGRESSION ANALYSIS

To identify independent predictors of depressive symptoms, a multivariate logistic regression model was fitted, including all variables that were significant at the bivariate level and those theoretically relevant based on prior literature (financial status, smoking status, physical activity, year of study, marital status, student type, parental education). There were no missing data; all 312 cases were included.

The overall model was statistically significant ($\chi^2 = 25.70$, $df = 5$, $p < .001$), and demonstrated good fit (Hosmer–Lemeshow $\chi^2 = 3.31$, $df = 6$, $p = .769$). However, the model explained only a modest proportion of the variance in depressive symptoms (Cox & Snell $R^2 = 0.079$, Nagelkerke $R^2 = 0.118$).

INDEPENDENT PREDICTORS OF DEPRESSIVE SYMPTOMS WERE:

- **Financial status:** Financially dependent students had almost three times higher odds of depressive symptoms compared to fully independent students (AOR = 2.92, 95% CI: 1.41–6.05, $p = .004$). Partially independent students had even higher odds (AOR = 3.64, 95% CI: 1.38–9.62, $p = .009$).
- **Smoking status:** Non-smokers had significantly lower odds of depressive symptoms compared to smokers (AOR = 0.22, 95% CI: 0.08–0.59, $p = .003$).
- **Physical activity:** No significant associations were observed for physical activity after adjustment for other covariates.

TABLE 4. ADJUSTED ODDS RATIOS (AOR) FOR FACTORS ASSOCIATED WITH DEPRESSIVE SYMPTOMS (PHQ-9 ≥ 5 ; N = 312)

Predictor	AOR	95% CI	p-value
Financial status			
Financially dependent vs. fully independent	2.92	1.41 – 6.05	.004*
Partially independent vs. fully independent	3.64	1.38 – 9.62	.009*
Smoking status			
Non-smoker vs. smoker	0.22	0.08 – 0.59	.003*
Physical activity			
Active vs. sedentary	0.52	0.23 – 1.18	.118
Moderate vs. sedentary	1.35	0.64 – 2.83	.432

*Statistically significant at $p < .05$

DISCUSSION

This cross-sectional study identified a high prevalence (75.3%) of depressive symptoms among male medical students at ANMC a constituent college of Superior University, as assessed by the PHQ-9. Financial dependence and smoking emerged as independent risk factors for depressive symptoms in multivariate analyses. In contrast, no significant associations were observed for year of study, marital status, student residency, parental education, or physical activity after adjustment for confounders.

The observed prevalence of depressive symptoms is notably higher than that reported among medical students in meta-analyses from both global and regional contexts (3,5). For example, Rotenstein et al. (2016) reported a pooled prevalence of 27.2% for depression or depressive symptoms in medical students internationally. Several factors may account for this elevated rate, including unique academic and psychosocial stressors within the study population, cultural differences in reporting, and the all-male composition of the sample. Financial dependence was strongly associated with depressive symptoms, with financially dependent and partially independent students demonstrating approximately three- to four-fold higher odds of depression compared to fully independent peers. This finding aligns with previous studies reporting a significant association between financial stress and depression in university students (4,8). Financial insecurity may exacerbate psychological distress by increasing perceived burdens, limiting access to coping resources, and heightening future uncertainty (4). Current smoking was also independently associated with depressive symptoms, consistent with prior research demonstrating a robust link between tobacco use and mental health problems in student populations (9,8). While causality cannot be established in a cross-sectional design, these findings suggest that smoking may function as a maladaptive coping mechanism or share underlying risk factors with depression (9). Interestingly, while sedentary behavior was

associated with depressive symptoms in bivariate analysis, this relationship was not significant after adjusting for other covariates. This result diverges from some prior studies that have identified physical inactivity as a predictor of depression among students (2). It is possible that the effects of physical activity are attenuated in the presence of stronger psychosocial risk factors or that residual confounding remains. No significant associations were observed for other demographic or academic variables. The lack of association with year of study and student residency is consistent with several prior studies (3,8), suggesting that these factors may be less relevant to male medical student mental health than financial and behavioral variables.

LIMITATIONS

- The cross-sectional design prevents establishing causality between risk factors and depressive symptoms.
- The study included only male undergraduate students from a single university, limiting generalizability to other populations (e.g., females, students from other institutions).
- All measures relied on self-report questionnaires, increasing the risk of recall bias and social desirability bias.
- The PHQ-9 is a screening tool and does not provide a clinical diagnosis of depression.
- Potentially important confounding factors (e.g., academic performance, social support, previous mental health history, substance use) were not assessed.

RECOMMENDATIONS

- Implement routine mental health screening and targeted support for high-risk student groups, particularly those who are financially dependent or smoke.

- Develop and offer financial counseling and smoking cessation programs as part of university student services.
- Expand future research to include diverse samples (e.g., female students, multiple universities) for better generalizability.
- Conduct longitudinal studies to clarify causal relationships between risk factors and depressive symptoms.
- Explore additional psychosocial, academic, and behavioral variables in future studies to better understand the determinants of student mental health.
- Consider qualitative research to gain deeper insight into cultural and contextual influences on depressive symptoms.

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PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)**CONSENT**

Participation in this survey is voluntary. All information will be kept confidential and used only for research purposes. By filling out this form, you agree to participate in this study.

DEMOGRAPHIC INFORMATION

Please check (✓) or fill in your answer:

- **Age:** _____ years
- **Year of Study:** 1st 2nd 3rd 4th 5th
- **Marital Status:** Single Married
- **Residency:** Boarder (Dorm) Day Scholar
- **Parental Education:** High school or below Bachelor's Master's or higher
- **Financial Status:** Dependent Partially Independent Fully Independent
- **Smoking:** Non-smoker Smoker
- **Physical Activity:** Active Moderate Sedentary

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? (Check "✓" one answer per row)

#	Problem	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1	Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Trouble falling/staying asleep, or sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5	Poor appetite or overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Feeling bad about yourself or that you are a failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Trouble concentrating on things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Moving/speaking slowly or being fidgety/restless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Thoughts you would be better off dead or hurting yourself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FOR OFFICE CODING:		0	+ ____	+ ____	+ ____

= Total Score: _____

If you checked off any problems above, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all Somewhat difficult Very difficult Extremely difficult