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Prevalence and Predictors of Depression and Anxiety Among Pharmacy Students: Evidence from a Cross-Sectional Analysis

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Abstract

Background: This study aimed to assess the prevalence of depressive and anxiety symptoms and identify associated factors among undergraduate pharmacy students at a university in Zawia, Libya.

Materials and Methods: A cross-sectional study was conducted between April and May 2025 among 342 pharmacy students. Depressive and anxiety symptoms were evaluated using the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scales, respectively. Sociodemographic, academic, and lifestyle data were collected. Associations were analyzed using non-parametric tests, Spearman's correlation, and multiple linear regression.

Results: The prevalence of moderate-to-severe depressive symptoms was 67.0%, while moderate-to-severe anxiety affected 60.6% of participants. Regression analysis identified that better academic performance (β = -0.805; P = 0.008), engagement in physical activity (β = -1.438; P = 0.048), and better sleep quality (β = -1.846; P <0.001) were significant independent predictors of lower depression scores, explaining 20.9% of the variance. For anxiety, sleep quality was the only significant predictor in the regression model (β = -1.399; P <0.001), explaining 17.5% of the variance.

Conclusions: Depression and anxiety are highly prevalent among pharmacy students in Libya, sleep quality was a key modifiable predictor for both conditions. Interventions focused on improving sleep hygiene, promoting physical activity, and providing academic support could help mitigate psychological distress in this population.

Keywords: Anxiety; Depression; Libya; Pharmacy Students.

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INTRODUCTION

Mental health challenges, particularly anxiety and depression, are increasingly prevalent among university students influenced by a range of academic, lifestyle, and health-related factors. Students enrolled in demanding healthcare programs, such as medicine and pharmacy, often report higher stress levels than peers in other disciplines or the general population.[1,2]

Globally, reviews highlight substantial risks among medical students. One meta-analysis reported a global depression prevalence of 27.2%, with approximately 11.1% of students experiencing suicidal thoughts.[3] In the United States, rates among medical students were found to be 19% for depression and 24% for anxiety.[4] Another study in Bangladesh reported that the prevalence of anxiety and depression was 26% and 43.6%, respectively.[5] However, data focusing on pharmacy students is more limited; evidence from the Middle East and other developing regions suggests a high prevalence among pharmacy students. For instance, in Saudi Arabia, one study reported an anxiety prevalence of 49%.[6] In Egypt, 26.6% of male medical students exhibited depressive

symptoms, while 38.8% experienced anxiety.[7] These figures often meet or exceed prevalence rates reported for medical students in similar regions, such as Palestine (depression 43.4%, anxiety 76.5%).[8] and Egypt (depression 63.6–64.2%, anxiety 77.1–78.4%).[9]

In Libya, a study in Tripoli revealed a high prevalence of depression (42.8% abnormal, 44.5% borderline) and anxiety (39% abnormal, 33% borderline) using the Hospital Anxiety and Depression Scale (HADS), highlighting a significant mental health burden among Libyan pharmacy students.[10] Mental disorders are strongly linked to reduced academic performance, difficulties with concentration, lower motivation, and poorer overall educational outcomes.[5,6,11] Academic struggles can hinder students' ability to complete the rigorous pharmacy curriculum. Mental health challenges also affect personal well-being, leading to emotional distress, social withdrawal, and disrupted sleep patterns.[8,10,12]

Libyan pharmacy students face intensified challenges due to the country's political conflict, economic instability, and daily disruptions. They also endure a demanding curriculum, long study hours, and significant sleep deprivation. The authors highlight the group's vulnerability and recommend implementing mental health support services.[10]

Understanding the unique prevalence and risk factors within specific institutions is crucial for designing targeted interventions. Therefore, this cross-sectional study aims to assess the prevalence of anxiety and depression and identify associated factors among undergraduate pharmacy students, providing essential local data and contributing to the broader understanding of student mental health.

MATERIALS AND METHODS

Study design and Study Tool

The study was conducted in Zawia University; it is one of the major universities in the western region of Libya, in the period between April 2025 and July 2025. The study tool was a questionnaire divided into three sections. The first section collected sociodemographic information, including age, gender, marital status, hours spent studying per day, annual academic performance**,** employment while studying**,** hours of sleep per night, sleep quality, time spent on the internet, and any chronic illnesses or disabilities. The second section included the Patient Health Questionnaire-9 (PHQ-9) to evaluate the symptoms of depression. The PHQ-9 has nine items rated from 0 (not at all) to 3 (nearly every day), with a total score ranging from 0 to 27. Minimal depression is represented by a score of 0–4, mild depression by a score 5–9, moderate depression by a score of 10–14, moderately severe depression by a score of 15–19, and severe depression by a score of 20–27. The third section contained the Generalized Anxiety Disorder-7 (GAD-7) scale to screen symptoms of anxiety. The GAD-7 consists of 7 items scored from 0 to 3, yielding a total score ranging from 0 to 21. Scores of 0–4 indicate minimal anxiety, 5–9 mild anxiety, 10–14 moderate anxiety, and 15–21 severe anxiety.

Study Population and Sample Size Calculation

The sample size was calculated using Epi Info software calculator. The estimate was based on a total population of approximately 470 pharmacy students enrolled at the Faculty of Pharmacy, University of Zawia, with a 95% confidence interval (CI) and a 5% margin of error. The estimated prevalence of depression and anxiety was assumed to be 42.8% for depression and 39% for anxiety.[10] Accordingly, the required sample size was determined to be 209 students. However, a total of 342 students ultimately participated, this number was proportionally distributed among each academic year. Stratified random sampling was applied.

Reliability and Data Quality

The English versions of the questionnaires, including the psychometric tools (i.e., PHQ-9 and GAD-7), were translated into Arabic by two separate translators. The official language of the Libyan population is Arabic. To ensure the accuracy and consistency of the translation, the questionnaires were then back-translated into English. Any differences between the versions were determined by a third reviewer until consensus was reached.

A pilot study involving 40 pharmacy students was conducted to assess the internal consistency of the questionnaire. The validation of the Arabic versions of the PHQ-9 and GAD-7 was excellent, as indicated by Cronbach's alpha values reported at 0.83, which suggests that the instrument is a dependable measure for study variables.

Ethical Approval

All participants provided informed consent before their inclusion in the study.

Statistical Analysis

The collected data were entered and analyzed using IBM SPSS for Windows version 26.0. The Shapiro test was performed to assess the normality, when the data were not normally distributed, the data were described using the median and interquartile range (IQR). The difference between the groups was analyzed using the Mann-Whitney U test or the Kruskal-Wallis test, as appropriate. To examine relationships between continuous variables, Spearman's correlation coefficients were calculated.

Multiple linear regression analyses were conducted to identify independent predictors. Variables with a p-value less than 0.05 in the univariate analyses (Mann-Whitney U test, Kruskal-Walli's test, and/or correlations) were included in the regression models to control and adjust for potential confounding factors. Adjusted R-squared was used to evaluate the goodness of fit for the regression models with statistical significance set at a p-value less than 0.05. Collinearity diagnostics, including variance inflation factor (VIF) and tolerance statistics, were used to assess multicollinearity among independent variables. A p-value of less than 0.05 was considered statistically significant throughout the analyses.

RESULTS

Characteristics of the participants

A total of 342 out of 470 students completed the survey, with a response rate of 72.8%. The median age of the students who participated in the study was 21 years with an IQR of 3 years. The majority of participants were aged over 20 years (65.8%), and 91.8% were female. The second-year students represent the largest academic group (33.9%), while the third-year students comprise the smallest proportion (18.7%). Regarding study habits, 65.2% of students reported that they studied less than 10 hours per day, and physical activity levels were low (82.5%). Choosing pharmacy as a field of study was primarily prompted by personal interest (64%), then by other reasons (20.5%), and family influence (15.5%). The academic performance among students was generally strong, with 48.5% reported as good and a total of 42.1% rated very good or excellent. Poor performance was rare, with fewer than 2% rated as poor or very poor outcomes. During their studies, the vast majority of students were not employed (77.5%). Regarding hours and quality of sleep, the data indicated that 78.7% slept fewer than 8 hours per night, and 43% reported their sleep quality as fair.27.5% of participants reported their quality of sleep as poor or very poor, while only 13.1% described it as very good or excellent. Regarding use of the internet, 72.5% of respondents reported that they spend a lot of time online, and 55.6% acknowledged delaying academic tasks because of it. Table 1 provides the demographic characteristics of the study participants.

Prevalence of depressive and anxiety symptoms among medical students

According to the PHQ-9 score, moderate depressive symptoms were prevalent in 33% of the students. 22.2% and 11.7% of the students had moderately severe to severe depression, respectively. Regarding anxiety symptoms, moderate anxiety symptoms were prevalent in 32.2% of respondents, mild anxiety affected 31.6% of students, while severe anxiety was experienced by 28.4% of participants. Table 2 shows depressive and anxiety symptoms as determined by PHQ-9 and GAD-7 scores.

A Spearman's rank-order correlation was carried out to assess the relationship between anxiety (GAD total score) and depression (PHQ-9 total score) among the students (n = 342). Data analysis showed a strong, positive correlation between the two scores, which was statistically significant (Spearman's rho (ρ) = 0.691, $p < 0.001$). This might indicate that as

Table 1. Sociodemographic, Academic, and Lifestyle Characteristics of the Participants (n = 342).

Characteristic	n	%
Age		
≤ 20 years	117	34.2
> 20 years	225	65.8
Gender		
Female	314	91.8
Male	28	8.2
Academic Year		
First year	94	27.5
Second year	116	33.9
Third year	64	18.7
Fourth year	68	19.9
Marital Status		
Single	304	88.9
Engaged	25	7.3
Married	13	3.8
Sleep Duration/Night		
< 8 hours	269	78.7
≥ 8 hours	73	21.3
Sleep Quality (Self-rated)		
Very poor	31	9.1
Poor	63	18.4
Fair	147	43.0
Good	56	16.4
Very good	36	10.5
Excellent	9	2.6
Chronic Illness/Disability		
Yes	28	8.2
No	314	91.8

Table 2. Prevalence of Depression and Anxiety Among Participants According to the Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) Scales (n = 342).

Condition (Scale)	Severity Category	n	%
Depression (PHQ-9)	Minimal (0–4)	20	5.8
	Mild (5–9)	93	27.2
	Moderate (10–14)	113	33.0
	Moderately Severe (15–19)	76	22.2
	Severe (20–27)	40	11.7
Anxiety (GAD-7)	Minimal (0–4)	27	7.9
	Mild (5–9)	108	31.6
	Moderate (10–14)	110	32.2
	Severe (15–21)	97	28.4

anxiety increases, depression tends to increase as well. The strength of this relationship suggests a meaningful correlation between anxiety and depression symptoms in the study population; however, different study designs, like cohort studies and clinical trials, should be performed to establish the association as well as causation between the two variables.

Association between characteristics of the participants and symptoms of depression

In this study, symptoms of depression vary between the participants, ranging from minimal to severe scores. Many factors are associated with depression among students. Notably, the older students (>20) had slightly higher depression ranks (mean rank=179.69) than younger students (mean rank=155.74) with a p-value of 0.033, which reflects the statistically significant difference between groups. In addition, mean ranks of the academic year rise from 149.70 (1st year) to 188.82 (4th year) with a p-value of 0.040, which indicates a significant difference between at least two academic years. Spearman correlation (0.114, p = 0.036) shows a weak positive correlation that might be explained by the higher year exhibiting slightly higher depression scores. Physical activity plays an important role in overcoming depression, as in this study, students who do not exercise had higher mean ranks (178.68) than those who exercise (137.68), suggesting that students who do not exercise tend to exhibit higher levels of depressive symptoms (p=0.004). Among the six annual academic performances, the depression score differed significantly (p = 0.002). The mean rank decreased from 309 in the very poor category to 144.66 in the excellent category. Spearman's correlation showed a weak but statistically significant negative association between academic performance and depression scores (rho = -0.185, p = 0.001). Additionally, the mean rank of PHQ-9 depression scores decreased progressively from students who slept less than 8 hours (mean rank=179.04) to students who slept more than 8 hours per night (mean rank=143.70). Spearman's correlation analysis revealed a weak but statistically significant negative association between PHQ-9 scores and average nightly sleep duration (rho = –0.147, p = 0.006, N = 342), indicating that participants who reported longer sleep durations tended to have lower depression severity. Students who had very poor sleep quality had substantially higher PHQ-9 depression scores; there were statistically significant differences in depression scores across the six sleep-quality groups (p < 0.001). Spearman's rank correlation showed a moderate, statistically significant negative association between sleep quality and depression severity (rho = –0.408, p < 0.001), suggesting that better self-rated sleep quality is linked to lower depression symptoms. Moreover, participants with a chronic illness/disability have a higher mean rank than healthy students (209.43 vs. 168.12), which indicates that the students with chronic illness and disability have slightly higher depression scores (p-value = 0.034).

Characteristics like marital status, hours spent studying per day**,** employment, and the time spent on the internet were not significantly associated with the PHQ-9 scores (*p*-value > 0.05). Details of the associations between characteristics of the participants and symptoms of depression are shown in Table 3.

Table 3. Associations Between Participant Characteristics and Depressive Symptoms (PHQ-9 scores)

Characteristic	Median	Q1	Q3	IQR	Mean rank	P-value	Correlation Coefficient	P- value
Age								
≤ 20	11	7	15	8	155.74	0.033	0.115	0.033
> 20	12	9	17	8	179.69			
Academic year								
First year	11	7	15	8	149.70	0.040	0.114	0.036
Second year	12	9	17.7	8.5	182.34			
Third year	11	8	16	8	165.47			
Fourth year	13	9	17	8	188.82			
Marital Status								
Single	12	8	16	8	169.96	0.412	0.047	0.384
Engaged	12	7	18	11	171.64			
Married	15	10	18	8	207.19			
How many hours do you spend studying per day?								
Less than 10 hours	11	9	17	8	170.25	0.748	0.17	0.748
More than 10 hours	12	8	17	9	173.85			
Do you exercise?								
No	12	9	17	5	178.68	0.004	-0.158	0.003
Yes	10	6.5	14	4	137.68			
Place of residence								
City	12	9	17	8	174.13	0.323	-0.053	0.324
Village	12	8	15	7	160.92			
Do you live near the university?								
No	12	8	17	9	172.91	0.805	-0.013	0.806
Yes	12	8	17	9	170.27			
Reasons for choosing the field of pharmacy								
My desire	12	8	16	8	165.59	0.223	0.067	0.213
The family's wish	13	9	17	8	191.25			
Other	11.5	9	17	8	175.04			
Annual academic performance								
Very Poor	21	19	23	4	309	0.002	-.185	0.001
Poor	25	18.50	25	6.50	281.83			
Fair	15	11	18.50	7.50	218.19			
Good	12	9	16	7	173.19			
Very good	11	8	17	9	164.63			
Excellent	10.50	7	14	7	144.66			
Are you employed while studying								
No	12	8	16	8	169.12	0.408	.408	0.409
Yes	12	9	17	8	179.69			
How many hours of sleep do you get per night?								
Less than 8 hours	12	12	17	5	179.04	0.007	-.147	0.006
More than 8 hours	10	10	14	4	143.70			
How would you rate the overall quality of your sleep?								
Very poor	18	14	23	9	253.55	.000	-0.408	0.000
Poor	14	11	18.50	7.5	204.05			
Fair	12	9	16.50	7.5	175.12			
Good	11	7.5	13	5.5	140.96			
Very good	8	6	11	5	92.60			
excellent	8	7	10	3	107.56			
Do you spend a lot of time on the internet?								
No	13	8	18	10	180.84	0.282	-0.58	0.282
Yes	11	9	16	7	167.96			
Do you delay completing your academic tasks because of internet use?								
No	11	8	17	9	166.92	0.443	0.042	0.444
Yes	12	9	17	8	175.16			
Do you suffer from any chronic illnesses or disabilities?								
No	12	8	16	8	168.12	0.034	0.115	0.034
Yes	14.50	10.5	19	8.5	209.43			

PHQ-9 = Patient Health Questionnaire-9; IQR = interquartile range; Q1 = First Quartile; Q3 = Third Quartile.
Marital status, study hours, employment, internet use, and other variables showed no significant association with PHQ-9 scores (P > 0.05)

A multiple linear regression analysis was conducted to adjust for and isolate potential confounding factors. Variables that showed significant associations with PHQ-9 scores in initial analyses (Mann–Whitney U and Kruskal–Walli's test) were retained in the model. These were physical activity ($p = 0.048$), annual academic performance ($p = 0.008$), and quality of sleep ($p < 0.01$). Other variables, such as age, academic year, chronic illness/disability, and average hours of sleep per night, were no longer statistically significant after adjustment for other variables ($p > 0.05$). Multicollinearity was not observed in the data (tolerance values > 0.1), and all studentized deleted residuals remained within ±3 standard deviations. Visual inspection of the Q–Q plot suggested that the residuals followed a normal distribution. The regression model was a significant predictor of PHQ-9 scores ($F = 13.17$, $p < 0.01$), explaining 20.9% of the variability in the outcome. Higher academic performance was significantly associated with lower PHQ-9 scores ($B = −0.805$, $p = 0.008$), adjusting for other variables. Students who participated in physical activity also had lower PHQ-9 scores compared to those not engaging in exercise ($B = -1.438$, $p = 0.048$). Furthermore, enhanced sleep quality showed a strong inverse association with PHQ-9 scores ($B = -1.846$, $p < 0.01$). Table 4 provides a detailed summary of the regression analysis.

The regression equation was PHQ-9 Total=20.919−1.438(Exercise)−0.805(Annual grade) −1.846(Overall sleep quality).

Associations Between Student Characteristics and Anxiety Symptoms

The analysis reported several significant associations between participants' characteristics and anxiety symptoms. Students aged over 20 years reported significantly higher anxiety scores compared to younger peers ($p = 0.048$, $r = 0.107$). Participants who studied over 10 hours daily had a greater likelihood of experiencing anxiety symptoms than those studying fewer hours ($p = 0.004$, $r = 0.156$). Improved annual academic performance demonstrated a slight but significant correlation with lower anxiety scores ($p = 0.037$, $r = –0.113$). Sleep-related factors demonstrated robust associations: students sleeping fewer than 8 hours per night demonstrated substantially increased anxiety symptoms ($p < 0.001$, $r = –0.220$), and better overall sleep quality was strongly associated with lower anxiety levels among students. ($p < 0.001$, $r = –0.386$). When considering lifestyle influences, excessive internet use was linked to increased anxiety levels ($p = 0.017$, $r = –0.129$). Additionally, students with chronic illnesses or disabilities showed a significant increase in anxiety scores compared to their healthy counterparts ($p = 0.049$, $r = –0.106$). Other characteristics—such as academic year, marital status, physical activity, place of residence, proximity to the university, reasons for choosing pharmacy, employment status, and delaying academic tasks due to internet use—were not found to be significantly correlated with anxiety symptoms ($p > 0.05$). More details are shown in Table 5.

A multiple linear regression was conducted to assess predictors of GAD-7 anxiety scores. sleep quality rating was the only significant predictor, with higher sleep quality correlated with decreased anxiety scores ($B = −1.399$, $p < .001$). Hours of study per day ($p = .096$) and hours of sleep per night ($p = .073$) showed non-significant trends; other variables like age group, long internet use, and chronic illness/disability were not statistically significant. (all $p > .05$). Multicollinearity was not observed in the data (tolerance values > 0.1), and all studentized deleted residuals were within ±3 standard deviations. Visual inspection of the Q–Q plot indicated that residuals were approximately normally distributed. The regression model significantly predicted GAD-7 scores ($F = 13.06$, $p < 0.01$), explaining 17.5% of the variance in the outcome. Table 6 illustrates a detailed summary of the regression analysis.

DISCUSSION

Multiple factors may have contributed to the psychological well-being of pharmacy students during their undergraduate studies, as indicated by the rising prevalence of depression and anxiety symptoms. Accordingly, this study was designed to estimate the prevalence of depression and anxiety and to explore the factors associated with these psychological outcomes.

Table 4. Multiple Linear Regression Analysis of Factors Associated with Patient Health Questionnaire-9 (PHQ-9) Depression Scores.

Predictor	B	SE	β	P-value	95% CI (LL–UL)
Constant	20.919	2.003	–	<0.001	16.978–24.859
Age group (>20 years)	0.171	0.804	0.014	0.831	-1.410–1.753
Academic year (higher)	0.303	0.353	0.058	0.391	-0.391–0.998
Physical activity (yes)	**-1.438**	**0.726**	**-0.097**	**0.048**	**-2.867 – -0.010**
Academic performance	**-0.805**	**0.300**	**-0.133**	**0.008**	**-1.395 – -0.214**
Sleep duration (≥8 hrs)	0.116	0.711	0.008	0.870	-1.283–1.515
Sleep quality (better)	**-1.846**	**0.255**	**-0.381**	**<0.001**	**-2.348 – -1.345**
Chronic illness (yes)	1.458	1.025	0.071	0.156	-0.560–3.475

B = unstandardised coefficient; SE = standard error; β = standardised coefficient; CI = confidence interval; LL = lower limit; UL = upper limit.
Model summary: Adjusted $R^2 = 0.209$, $F = 13.17$, $P < 0.001$.

Table 5. Associations Between Participant Characteristics and Anxiety Symptoms (GAD-7 scores).

Characteristic	Median	Q1	Q3	IQR	Mean rank	P-value	Correlation Coefficient	P- value
Age								
≤ 20	10	6	15	9	156.89	0.048	0.107	0.048
> 20	12	8	15	7	179.10			
Academic year								
First year	10	7	15	8	157.59	0.295	0.045	0.406
Second year	12	8	15	7	179.78			
Third year	11	8	16	8	182.68			
Fourth year	10.50	7	15	8	166.09			
Marital Status								
Single	11	7	15	8	170.70	0.597	0.026	0.635
Engaged	10	6	16	10	167.28			
Married	12	10	16	6	198.38			
How many hours do you spend studying per day?								
Less than 10 hours	11	7	14	7	160.25	0.04	0.156	0.004
More than 10 hours	12	9	16	8	192.58			
Do you exercise?								
No	11	7	15	8	176.11	0.061	-0.101	0.061
Yes	10	6	15	9	149.11			
Place of residence								
City	11	7	15	8	171.38	0.964	0.002	0.964
Village	11	8	15	7	171.99			
Do you live near the university?								
No	12	8	15	7	178.55	0.218	-0.067	0.217
Yes	11	7	15	8	165.37			
Reasons for choosing the field of pharmacy								
My desire	11	7.5	15	7.5	174			
The family's wish	11	7	16	9	175.97	0.455	-0.052	0.341
Other	10	7	14	7	157.91			
Annual academic performance								

Very Poor	16.50	13	20	7	274.75	0.122	- 0.113	0.037
Poor	16	11.50	17.50	6	225.50			
Fair	12	10	15.50	5.5	199.83			
Good	11	7	15	8	171.15			
Very good	11	7	15	8	174.81			
Excellent	11	7	13	6	148.04			
Are you employed while studying								
No	11	7	15	8	169.95	0.591	0.029	0.591
Yes	11	7	16	9	176.82			
How many hours of sleep do you get per night?								
Less than 8 hours	12	8	15	7	182.82	0.000	-0.220	0.000
More than 8 hours	8	5	13	8	129.79			
How would you rate the overall quality of your sleep?								
Very poor	16	11.50	19	7.5	241.40	0.000	-0.386	0.000
Poor	13	9.50	16	6.5	207.42			
Fair	11	8	15	7	174.54			
Good	9	6.5	12.5	6	141.51			
Very good	7	5	10	5	100.54			
excellent	7		11	6	100			
Do you spend a lot of time on the internet?								
No	12	8	16	8	192.16	0.017	-0.129	0.017
Yes	11	7	14	7	163.67			
Do you delay completing your academic tasks because of internet use?								
No	11.50	8	15	7	178.77	0.223	-0.066	0.224
Yes	11	7	14	7	165.68			
Do you suffer from any chronic illnesses or disabilities?								
No	11	7	15	8	168.37	0.049	-0.106	0.049
Yes	12.50	9	18	9	206.64			

GAD-7 = Generalised Anxiety Disorder-7; Q1 = first quartile; Q3 = third quartile; IQR = interquartile range. Note: P-values and correlation coefficients shown are from univariate analyses (Mann-Whitney U or Kruskal-Wallis tests, and Spearman's correlation). Characteristics (place of residence, proximity to university, reason for choosing pharmacy, employment status, delaying tasks due to internet) showed no significant association with anxiety symptoms (P > 0.05)

Table 6. Multiple Linear Regression Analysis of Factors Predicting Anxiety Symptoms (GAD-7 scores).

Predictor	B	SE	β	P-value	95% CI (LL–UL)
Constant	15.238	1.650	–	<0.001	11.993–18.483
Age group (>20 years)	0.632	0.526	0.060	0.230	-0.403–1.667
Study hours per day (≥10 hours)	0.877	0.525	0.084	0.096	-0.157–1.910
Sleep duration per night (≥8 hours)	-1.145	0.636	-0.094	0.073	-2.395–0.106
Sleep quality (higher rating)	**-1.399**	**0.224**	**-0.329**	**<0.001**	**-1.840 – -0.958**
Excessive internet use (yes)	-0.960	0.556	-0.086	0.085	-2.054–0.134
Chronic illness/disability (yes)	1.416	0.909	0.078	0.120	-0.372–3.205

GAD-7 = Generalised Anxiety Disorder-7; B = unstandardised coefficient; SE = standard error; β = standardised coefficient; CI = confidence interval; LL = lower limit; UL = upper limit.

When comparing our findings with previous studies conducted in Libya and other regions,

the present study found that 33% of pharmacy students were exposed to moderate depression symptoms, while 22.2% and 11.7% exhibited moderately severe and severe depression, respectively. These results are in line with previous research in the region,[10] which reported a prevalence of 42.8% of abnormal depression symptoms among Libyan pharmacy students. Likewise, our results on anxiety showed that 32.2% of students suffered from moderate anxiety symptoms, while 28.4% reported severe anxiety. These findings are comparable to the prevalence of 39% abnormal anxiety symptoms reported by Aljabo et al. (2024) in the Libyan context.[10] Additionally, a previous study conducted in Libya reported that 25% of participants experienced moderate depression,[13] which is lower than the prevalence observed in the present study. However, Sherif et al. (2021) focused on medical students rather than pharmacy students, and their sample size also differed. Similarly, El-Najjar et al. (2025) reported that the prevalence of severe depression among medical students at Benghazi University was 8.5%, compared with 11.7% in the present study.[14] Such differences may be attributed to a variation in study populations and the use of different depression assessment scales. Additionally, the high rates of prevalence that were observed in this study are in line with the results of other countries in the region. Studies in the Kingdom of Saudi Arabia reported the prevalence of anxiety at 49% among pharmacy students,[6] while studies in Egypt have documented moderate to severe anxiety symptoms in 57.1% and depression prevalence up to 69% among first-year medical students.[9] These outcomes collectively indicate that medical students in the Middle East and North Africa are facing major challenges in the field of mental health.

A strong positive correlation ($\rho = 0.691$, $p < 0.001$) between the scores of anxiety and depression, which was statistically significant in this study, is worth noting and compatible with the existing literature. Rotenstein and others (2016), in their systematic review, reported that the symptoms of depression are often involved in anxiety among medical students.[3]

Academically, this study has identified many academic factors related to depression and anxiety. The higher academic years were linked to an increase in the score of depression, with the mean of the ranks increasing from 149.70 (first year) to 188.82 (fourth year) ($p = 0.04$). This outcome is consistent with previous studies that have shown an increase in mental health challenges with students' progress throughout their academic programs,[12] which reflects that increasing concerns about academic demands, clinical responsibilities, and future work will contribute to this direction.

Interestingly, the present study found that the best academic performance was associated with a decrease in the score of depression ($p = 0.002$). This correlation remained significant even after controlling for confounding variables of regression analysis ($B = -0.805$, $p = 0.008$). This outcome is in line with Okorie et al. (2021), who reported a negative correlation between depression and academic achievement.[11]

Regarding depression-age relationships, this finding reported that older students (> 20 years) experienced a high score of depression ($P = 0.033$) and anxiety ($P = 0.048$) compared to younger ones. Concerning disabilities, students with chronic diseases or disabilities are noticeably reported to have higher scores of depression ($P = 0.034$) and anxiety ($P = 0.049$). These results highlight the importance of consideration related to age and health condition when developing support services for pharmacy students.

Several lifestyle factors may have contributed to the prevalence of depression and anxiety among participants. This study showed that lifestyle factors were emerging as significant correlates of mental health. Physical activity was inversely related to depression symptoms ($p = 0.004$), and lower depression scores were reported by students who exercise. This protective effect remained significant in the regression analysis ($B = -1.438$, $p = 0.048$). The exercise outcome is supported by previous research highlighting the benefits of physical activity for mental health among university students.[1,4]

Finally, sleep-related factors demonstrated a robust correlation with both depression and anxiety. Students who sleep fewer than 8 hours

per night reported higher scores of depressions ($p = 0.007$) and anxiety ($p < 0.001$). Also, the quality of sleep emerged as the strongest predictor of both depression ($B = -1.846$, $p < 0.001$) and anxiety ($B = -1.399$, $p < 0.001$) in the regression analyses. These outcomes align with a previous study that reported an average sleep duration of 6.5 hours per night among Libyan pharmacy students, identifying sleep disturbances as a significant concern.[10]

CONCLUSION

A high prevalence of depression and anxiety is widespread among pharmacy students in Libya, with sleep quality identified as a significant predictor of both outcomes. Highlighting the crucial need for targeted interventions that promote healthy sleep habits, enhance physical activity, and support academic performance. This may help reduce psychological distress in this population.

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