





# Assessment of Suicidal Ideation and Its Association with Mental Health Disorders Among Medical Sciences Students: A Cross-Sectional Study

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## Abstract

**Background:** Depression, anxiety, and stress are prevalent among medical sciences students globally and contribute to suicidal ideation. Many risk factors are associated with the mental health problems of medical sciences students.

**Objectives:** This study aimed to estimate the prevalence of depression, anxiety, stress, and suicidal ideation, as well as their associated factors, among medical, dental, and pharmacy students in the aftermath of the COVID-19 pandemic.

**Methods:** In this cross-sectional study, we included 292 students. We collected background information and data on socioeconomic status (SES). We used the Depression, Anxiety, and Stress Scales-21 (DASS-21) and the Beck Scale for suicidal ideation (BSSI) to assess depression, anxiety, stress, and suicidal ideation. The data were analyzed using a linear regression model.

**Results:** The prevalence of medium to high-risk suicidal thoughts among all students was 56.8%, with 6.5% of students reporting high-risk suicidal thoughts. The prevalence of mild to extremely severe depression, anxiety, and stress was 66.8%, 59.5%, and 52.1%, respectively. Factors significantly associated with the severity of suicidal thoughts included being single ( $\beta = -2.11$ ), having a positive history of psychiatric illness ( $\beta = 2.64$ ), having a positive history of chronic medical conditions ( $\beta = 4.23$ ), and higher scores of depression ( $\beta = 1.97$ ) and anxiety ( $\beta = 0.49$ ). Additionally, a higher academic semester and greater interest in courses were significantly associated with lower scores of depression, anxiety, and stress.

**Conclusions:** The findings of this study revealed a higher rate of depression, anxiety, stress, and suicidal ideation among medical sciences students compared to the global prevalence. This underscores the urgent need for targeted interventions to improve students' mental health. More specifically, recognizing the risk factors for suicidality and promoting access to counseling services and mental health awareness programs can help prevent suicidal thoughts.

**Keywords:** Depression, Mental Health, Medical Students, Risk Factors of Suicide, Suicidal Ideation

## 1. Background

Mental health issues are rising among global healthcare professionals due to factors such as high workloads, long shifts, emotional investment, competitive environments, and high-stress conditions (1, 2). Medical, dental, and pharmacy students are particularly affected, with high rates of mental health problems reported worldwide (2-5).

Symptoms of depression and anxiety are prevalent among these students:

- Approximately 27.2% of medical students exhibit symptoms of depression, and 25.7% suffer from anxiety (4).
- During the COVID-19 pandemic, 37% of dental students experienced depression (6).
- Anxiety and depression were reported among 30% and 22% of pharmacy students, respectively (2, 5).

Suicide attempts are a significant concern, with the risk among medical doctors being 5 to 7 times higher than that of the general population (7-9). Suicidal thoughts and attempts are reported in 17% and 1% of medical doctors, respectively (8).

In Iran, although limited studies have been conducted, high levels of stress, anxiety, depression, and suicidal thoughts have been reported among medical, dental, and pharmacy students (10-12). Reasons for suicides among young medical students and residents include long working hours, lack of sleep, difficult exams, low income, financial problems, and being away from families (13, 14). Despite the urgent need for interventions, due to the social stigma stemming from Iranian culture, medical students often avoid seeking help, especially from mental health professionals (13, 14).

## 2. Objectives

This study aims to estimate the prevalence of stress, anxiety, depression, and suicide-related thoughts and behaviors, and identify related risk factors among medical, dental, and pharmacy students at Shiraz University of Medical Sciences (SUMS), one of the largest and most important medical universities in the southwest of Iran, using an online survey-based approach. Chi-square and linear regression models were used to analyze the data.

## 3. Methods

### 3.1. Study Design and Participants

This cross-sectional study was conducted from November 2022 to December 2022. The study population consisted of medical, dental, and pharmacy students. Students who were willing to participate were included. Data were collected via a web-based structured questionnaire designed by a software engineer. The online version of the questionnaire was distributed to the social network groups of all semesters of medical, dental, and pharmacy students, and data collection continued until students from different majors and semesters had completed the questionnaire to ensure the representativeness of the study. In total, 292 students participated in the study. On the first page of the questionnaire, the aims of the study, as well as data protection and confidentiality, were outlined. All participants provided their consent to participate in the study by clicking a specific tab before responding to the questions. Participants who agreed to take part consented to anonymous data collection. Questionnaires that were filled out incompletely or by

individuals who were no longer students at SUMS were excluded from the study. This study was reviewed and approved by the ethics committee under code number IR.SUMS.REC.1401.687.

### 3.2. Instruments

**Background Information:** Data on gender, age, field of study, semester, marital status, and place of residence were collected. Students were asked to rate their interest in courses and the perceived difficulty of courses on a scale from one to ten. Additionally, data on the average hours spent in academic or clinical settings during the past month, visits to mental healthcare providers during the past year, history of previously diagnosed psychiatric illness, history of chronic medical conditions, and family history of psychiatric illness were also collected.

**Socioeconomic Status (SES) Questionnaire:** The standard SES Questionnaire was used in this study. This questionnaire assesses socioeconomic status by evaluating the tools available in the household (including television, washing machine, etc.) as well as the level of infrastructure of the household's place of residence for each person in the family. The SES Questionnaire categorizes socioeconomic status into five categories, ranging from 'very low' to 'very high.' The validity and reliability of the SES questionnaire have been previously confirmed by Sartipi et al. in the Iranian population, with an acceptable intraclass correlation coefficient of 0.87 (15).

#### 3.2.1. Depression, Anxiety, and Stress Scales-21

The Depression, Anxiety, and Stress Scales-21 (DASS-21) questionnaire is a self-report tool with 21 questions that measures stress, anxiety, and depression in students. It has three sections: Depression (assessing mood, motivation, and self-esteem), stress (measuring nervous tension and irritability), and anxiety (focusing on arousal, panic, and fear) (16). Each section contains seven questions, which are answered on a Likert scale. The severity of stress, anxiety, and depression is determined based on the work of Lovibond, S and Lovibond, P (16). The Farsi version of the DASS-21 used in Iran has confirmed reliability, with Cronbach's  $\alpha$  of 0.79 for anxiety, 0.91 for stress, and 0.93 for depression (17).

#### 3.2.2. Beck Scale for Suicidal Thoughts

The Beck Scale for suicidal thoughts (BSSI) questionnaire, consisting of 19 questions, measures the intensity of suicidal thoughts by assessing factors such as the desire to live or die, the frequency and control of

suicidal thoughts, and suicide attempts (18). Each item of the BSSI questionnaire is graded on a scale from 0 to 2 (18, 19). Scores range from 0 to 38, with higher scores indicating a higher risk of suicide. A score of 0 - 3 indicates low risk, 4 - 11 indicates medium risk, and 12 or more indicates high risk. The Farsi version of the BSSI is valid and reliable, with a Cronbach's  $\alpha$  of 0.827 (19).

### 3.3. Statistical Analysis

As mentioned in the objectives, our first goal was to estimate the prevalence of mental health disorders among medical sciences students. In this study, the sample size was calculated based on the Cochran formula. According to the results of Lin's study (20), the global prevalence of mental disorders in medical students was reported to be 48%, and considering an error of 0.12 ( $d = 0.12$  p), the sample size was estimated to be 290.

In this cross-sectional study, qualitative variables were presented as numbers and percentages, while quantitative variables were reported as means  $\pm$  standard deviation. The chi-square test was used to determine the relationship between the levels of depression, stress, and anxiety and the intensity of suicidal thoughts. Additionally, the relationship between the levels of depression, stress, anxiety, and intensity of suicidal thoughts with the field of study was assessed using the chi-square test. Linear regression was employed to identify the factors associated with depression, stress, and anxiety (considered as quantitative variables). Simple and multivariate linear regressions were also used to determine the factors related to suicidal thoughts. Variables with a p-value less than 0.2 in the simple linear regression model were included in the multivariate analysis. The significance level in this study was set at less than 0.05. Data were analyzed using SPSS Statistics software version 22 and Stata software version 14.

## 4. Results

### 4.1. Prevalence of Mental Health Issues

A total of 292 students (190 medical, 53 dental, and 49 pharmacy students) participated in the study. The majority of students (46.6%) resided in dormitories, and 71 students (24.3%) had a history of diagnosed psychiatric illness. The prevalence of high-risk suicidal thoughts among all students was 6.5%, with 3.3% of men and 8.8% of women reporting suicidal thoughts. Furthermore, the prevalence of high-risk suicidal thoughts among medical, dental, and pharmacy

students was 6.8%, 3.8%, and 8.2%, respectively. Other demographic and behavioral variables based on the intensity of suicidal thoughts are presented in Table 1.

The prevalence of extremely severe depression, anxiety, and stress among all students was 19.2%, 14.0%, and 8.6%, respectively. Among students with high-risk suicidal thoughts, 89.5%, 68.4%, and 73.6% reported high levels (severe and extremely severe) of depression, anxiety, and stress, respectively. As shown in Table 2, statistically significant associations were observed between the severity of stress, anxiety, and depression and the severity of suicidal thoughts ( $P$ -value  $< 0.001$ ).

The severity of depression, anxiety, stress, and suicidal thoughts among students, based on their field of study, is reported in Table 3. A statistically significant association was found between the severity of anxiety and the field of study ( $P$ -value  $< 0.046$ ). The extremely severe levels of depression, anxiety, and stress, as well as the high-risk level of suicidal thoughts based on the field of study, are presented in Figure 1. The prevalence of extremely severe depression, anxiety, and stress, as well as high-risk suicidal thoughts, was higher among pharmacy students than among medical and dental students.

### 4.2. Factors Associated with Mental Health Outcomes

Higher age ( $\beta = -0.45$ ;  $P$ -value = 0.027), higher academic semester ( $\beta = -0.39$ ;  $P$ -value = 0.022), and greater interest in the courses ( $\beta = -1.41$ ;  $P$ -value = 0.001) were significantly associated with a decrease in depression scores, while a history of psychiatric illness ( $\beta = 6.96$ ;  $P$ -value = 0.001) was significantly associated with an increase in depression scores. Female gender ( $\beta = 2.03$ ;  $P$ -value = 0.043), a history of psychiatric illness ( $\beta = 3.99$ ;  $P$ -value = 0.001), a history of chronic medical conditions ( $\beta = 4.10$ ;  $P$ -value = 0.016), and a positive family history of psychiatric illness ( $\beta = 2.27$ ;  $P$ -value = 0.038) were significantly associated with an increase in anxiety scores. However, a higher academic semester ( $\beta = -0.28$ ;  $P$ -value = 0.032) and greater interest in the courses ( $\beta = -0.50$ ;  $P$ -value = 0.021) were significantly associated with a decrease in anxiety scores. Additionally, higher age ( $\beta = -0.36$ ;  $P$ -value = 0.036), female gender ( $\beta = 3.12$ ;  $P$ -value = 0.005), and greater interest in the courses ( $\beta = -0.86$ ;  $P$ -value = 0.001) were significantly associated with a decrease in stress scores, while a history of psychiatric illness ( $\beta = 4.71$ ;  $P$ -value = 0.001), a history of chronic medical conditions ( $\beta = 5.30$ ;  $P$ -value = 0.005), and a positive family history of psychiatric illness ( $\beta = 3.04$ ;  $P$ -value = 0.011) were significantly associated with an increase in stress scores.

**Table 1.** Demographic and Characteristic Factors of the Participants<sup>a</sup>

Variables	Total (n = 292)	Suicidal Thoughts			P-Value
		Low Risk [126 (43.2)]	Medium Risk [147 (50.3)]	High Risk [19 (6.5)]	
Age (y)	22.90 ± 3.11	23.29 ± 3.67	22.62 ± 2.60	22.47 ± 2.52	0.176
Sex					0.155
Male	122 (41.8)	56 (45.9)	62 (50.8)	4 (3.3)	
Female	170 (58.2)	70 (41.2)	85 (50.0)	15 (8.8)	
Field of study					0.913
Medicine	190 (65.0)	82 (43.2)	95 (50.0)	13 (6.8)	
Dentistry	53 (18.2)	24 (45.3)	27 (50.9)	2 (3.8)	
Pharmacy	49 (16.8)	20 (40.8)	25 (51.0)	4 (8.2)	
Current semester	7 (5, 11)	7 (5, 11)	7 (5, 11)	6 (4, 9)	0.255
Attendance hours at the university per day	4 (6, 8)	4 (6, 8)	4 (6, 8)	4 (6, 8)	0.738
Perceived difficulty of the courses	8 (7, 9)	8 (7, 9)	8 (7, 9)	8 (8, 9)	0.230
Interest in the courses	7 (6, 9)	8 (6, 9)	7 (5, 9)	6 (4, 8)	0.001 <sup>b</sup>
Marital status					0.058
Single	265 (90.8)	109 (86.5)	137 (93.2)	19 (100)	
Married	27 (9.2)	17 (13.5)	10 (6.8)	0 (0.0)	
Previous mental healthcare provider visit	93 (31.8)	33 (26.2)	46 (31.3)	14 (73.7)	0.001 <sup>b</sup>
Positive history of psychiatric illness	71 (24.3)	19 (15.1)	37 (25.2)	15 (78.9)	0.001 <sup>b</sup>
Positive history of chronic medical conditions	27 (9.2)	6 (4.8)	16 (10.9)	5 (26.3)	0.006 <sup>b</sup>
Positive family history of psychiatric illness	84 (28.8)	33 (26.2)	41 (27.9)	10 (52.6)	0.057
Socioeconomic status					0.262
Very low	59 (20.2)	24 (19.0)	31 (21.1)	4 (21.1)	
Low	58 (19.9)	27 (21.4)	30 (20.4)	1 (5.3)	
Middle	59 (20.2)	24 (19.0)	32 (21.8)	3 (15.8)	
High	57 (19.5)	25 (19.8)	27 (18.4)	5 (26.3)	
Very high	59 (20.2)	26 (20.6)	27 (18.4)	6 (31.6)	
Residence status					0.195
Living with family	138 (47.3)	62 (49.2)	71 (48.3)	5 (26.3)	
Living in dormitory	117 (40.1)	48 (38.1)	59 (40.1)	10 (52.6)	
Living with roommates outside dormitory	13 (4.5)	5 (4.0)	8 (5.4)	0 (0.0)	
Living alone, not in the same city as family	24 (8.2)	11 (8.7)	9 (6.1)	4 (21.1)	

<sup>a</sup> Values are expressed as mean ± SD or No. (%) or median (Q1, Q3).

<sup>b</sup> Significant at 0.05.

#### 4.3. Factors Associated with Suicidal Thoughts

According to the simple linear regression model, female gender ( $\beta = 1.58$ ; P-value = 0.036), a positive history of psychiatric illness ( $\beta = 4.75$ ; P-value = 0.001), a positive history of chronic medical conditions ( $\beta = 5.54$ ; P-value = 0.001), and higher scores of stress ( $\beta = 0.33$ ; P-value = 0.001), depression ( $\beta = 0.37$ ; P-value = 0.001), and anxiety ( $\beta = 0.36$ ; P-value = 0.001) were significantly associated with an increase in the suicidal thoughts score. However, a higher academic semester ( $\beta = -0.23$ ; P-value = 0.018) and being married ( $\beta = -3.23$ ; P-value = 0.012) were significantly associated with a decrease in the suicidal thoughts score (Table 4).

In the multiple linear regression model, being single ( $\beta = -2.11$ ; P-value = 0.034), having a positive history of psychiatric illness ( $\beta = 2.64$ ; P-value = 0.001), and having a positive history of chronic medical conditions ( $\beta = 4.23$ ; P-value = 0.001), as well as higher scores of

depression ( $\beta = 1.97$ ; P-value = 0.001) and anxiety ( $\beta = 0.49$ ; P-value = 0.042), were significantly associated with suicidal thoughts (Table 5).

#### 5. Discussion

In this cross-sectional study, 66.8%, 59.5%, and 52.1% of all students experienced mild to extremely severe levels of depression, stress, and anxiety, respectively. Additionally, 56.8% of medical, dental, and pharmacy students exhibited medium to high-risk suicidal thoughts.

Moreover, interest in the courses was found to be positively associated with better mental health among students, while a diagnosed psychiatric illness was consistently linked to more severe depression, anxiety, stress, and suicidal thoughts. It is important to note that 24.3% of all students had a history of diagnosed psychiatric illness by a mental health professional. Furthermore, a history of psychiatric illness and chronic

**Table 2.** Depression, Anxiety and Stress Based on the Level of Suicidal Thoughts<sup>a</sup>

Variables	Total	Suicidal Thoughts			P-Value
		Low Risk	Medium Risk	High Risk	
<b>Depression</b>					< 0.001 <sup>b</sup>
Normal	94 (32.2)	70 (55.6)	24 (16.3)	0 (0.0)	
Mild	50 (17.1)	26 (20.6)	23 (15.6)	1 (5.3)	
Moderate	61 (20.9)	20 (15.9)	40 (27.2)	1 (5.3)	
Severe	31 (10.6)	6 (4.8)	24 (16.3)	1 (5.3)	
Extremely severe	56 (19.2)	4 (3.2)	36 (24.5)	16 (84.1)	
<b>Anxiety</b>					< 0.001 <sup>b</sup>
Normal	134 (45.9)	86 (68.3)	48 (32.7)	0 (0.0)	
Mild	31 (10.6)	12 (9.5)	18 (12.2)	1 (5.3)	
Moderate	58 (19.9)	15 (11.9)	38 (25.9)	5 (26.3)	
Severe	28 (9.6)	5 (4.0)	20 (13.6)	3 (15.8)	
Extremely severe	41 (14.0)	8 (6.3)	23 (15.6)	10 (52.6)	
<b>Stress</b>					< 0.001 <sup>b</sup>
Normal	116 (39.7)	74 (58.7)	40 (27.2)	2 (10.5)	
Mild	41 (14.0)	18 (14.3)	23 (15.6)	0 (0.0)	
Moderate	61 (20.9)	19 (15.1)	39 (26.5)	3 (15.8)	
Severe	49 (16.8)	12 (9.5)	30 (20.4)	7 (36.8)	
Extremely severe	25 (8.6)	3 (2.4)	15 (10.2)	7 (36.8)	

<sup>a</sup> Values are expressed as No. (%).

<sup>b</sup> Significant at 0.05.

medical conditions, along with higher scores of depression and anxiety, were consistently associated with high-risk suicidal thoughts.

### 5.1. Prevalence of Mental Disorders

In this study, only 32.2% of students were found to be free from depression, while severe depression was observed in 19.2% of students. This is concerning when compared to a systematic review that reported a 40% prevalence of depression among medical students globally (21). A previous systematic review estimated the prevalence of anxiety among medical students at 28% (22). However, 52.1% of SUMS students are experiencing anxiety, with 14.1% reporting severe anxiety. Pharmacy students also exhibit higher levels of anxiety compared to medical and dental students, which highlights the need for further research to explore these field-specific differences. About 59.5% of SUMS students are experiencing stress, with 8.6% experiencing severe stress, which is higher than the global average of 39% stress prevalence among medical students, as estimated by studies using the DASS-21 questionnaire (21). The increase in mental health issues may be influenced by post-COVID-19 conditions, warranting further studies for evaluation.

### 5.2. Factors Associated with Mental Disorders

Our study found that being female was linked to higher levels of depression and anxiety, consistent with prior research (23). No association was found between students' residence or socio-economic status and their mental health. Higher academic semesters and older age were associated with lower levels of depression, anxiety, and stress, which is consistent with previous studies (24, 25). These findings suggest that older students tend to have better mental health outcomes, possibly due to the challenges associated with the basic sciences semesters and the difficulty of transitioning from high school to the university environment, which may impact younger students.

A history of chronic or psychiatric illness, either personal or in a first-degree family member, is associated with higher levels of stress and anxiety. However, interest in courses correlates with reduced depression, anxiety, and stress. This is in line with previous studies that highlight the importance of motivation and satisfaction in student mental health (26).

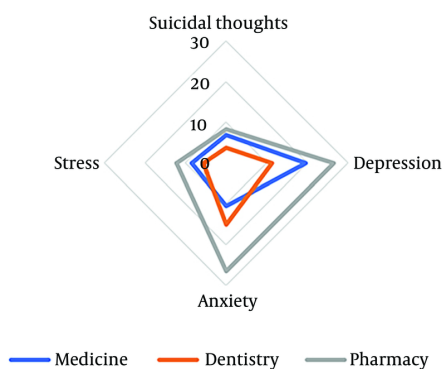
### 5.3. Prevalence of Suicidal Thoughts

**Table 3.** Depression, Anxiety, Stress, and Suicidal Thoughts Based on the Field of Study<sup>a</sup>

Variables	Field of Study			P-Value
	Medicine	Dentistry	Pharmacy	
<b>Depression</b>				0.427
Normal	63 (33.2)	18 (34.0)	13 (26.5)	
Mild	31 (16.3)	8 (15.1)	11 (22.4)	
Moderate	40 (21.1)	15 (28.3)	6 (12.2)	
Severe	19 (10.0)	6 (11.3)	6 (12.2)	
Extremely severe	37 (19.5)	6 (11.3)	13 (26.5)	
<b>Anxiety</b>				0.046 <sup>b</sup>
Normal	91 (47.9)	29 (54.7)	14 (28.4)	
Mild	19 (10.0)	6 (11.3)	6 (12.2)	
Moderate	43 (22.6)	5 (9.4)	10 (20.4)	
Severe	17 (8.9)	5 (9.4)	6 (12.2)	
Extremely severe	20 (10.5)	8 (15.1)	13 (26.5)	
<b>Stress</b>				0.798
Normal	77 (40.5)	23 (43.4)	16 (32.7)	
Mild	27 (14.2)	5 (9.4)	9 (18.4)	
Moderate	41 (21.6)	11 (20.8)	9 (18.4)	
Severe	29 (15.3)	11 (20.8)	9 (18.4)	
Extremely severe	16 (8.4)	3 (5.7)	6 (12.2)	
<b>Suicidal thoughts</b>				0.913
Low risk	82 (43.2)	24 (45.3)	20 (40.8)	
Risky	96 (50.0)	27 (50.9)	25 (51.0)	
High risk	13 (6.8)	2 (3.8)	4 (8.2)	

<sup>a</sup> Values are expressed as No. (%).

<sup>b</sup> Significant at 0.05.



**Figure 1.** Extremely severe levels of depression, anxiety, and stress, as well as the high-risk level of suicidal thoughts, in different fields of study

In our study, we found that a substantial 56.8% of students reported having suicidal thoughts of medium to high risk. This is notably higher than the 32% prevalence found in a similar study conducted at Tehran

Medical University during the COVID-19 pandemic (27). The difference in these percentages could be attributed to the distinct data collection tools used in each study. Prior to the pandemic, international studies estimated

**Table 4.** Factors Associated with Suicidal Thoughts Assessed Using Simple Linear Regression Model

Variables	$\beta$	CI for $\beta$	SE	P-Value
Age	-0.21	-0.45 to 0.02	0.120	0.072
<b>Sex</b>				
Male	Ref.	-	-	-
Female	1.58	0.10 to 3.07	0.754	0.036 <sup>a</sup>
Current semester	-0.23	-0.43 to -0.04	0.100	0.018 <sup>a</sup>
Perceived difficulty of the courses	0.43	-0.09 to 0.95	0.268	0.111
Interest in the courses	-0.57	-0.89 to -0.25	0.161	< 0.001 <sup>a</sup>
Attendance hours at the university per day	0.01	-0.02 to 0.01	0.01	0.672
<b>Marital status</b>				
Single	Ref.	-	-	-
Married	-3.23	-5.74 to -0.71	1.279	0.012 <sup>a</sup>
Positive history of psychiatric illness	4.75	3.12 to 6.31	0.827	< 0.001 <sup>a</sup>
Positive history of chronic medical conditions	5.54	3.08 to 8.01	1.251	< 0.001 <sup>a</sup>
Positive family history of psychiatric illness	1.46	-0.16 to 3.08	0.823	0.077
Socioeconomic status	0.14	-0.37 to 0.66	0.265	0.588
<b>Stress</b>	0.33	0.25 to 0.39	0.035	< 0.001 <sup>a</sup>
Depression	0.37	0.28 to 0.43	0.026	< 0.001 <sup>a</sup>
Anxiety	0.36	0.32 to 0.42	0.039	< 0.001 <sup>a</sup>

<sup>a</sup> Significant at 0.05.

**Table 5.** Factors Associated with Suicidal Thoughts Assessed Using Multiple Linear Regression Model

Variables	$\beta$	CI for $\beta$	SE	P-Value
<b>Marital status</b>				
Single	Ref.	-	-	-
Married	-2.11	-4.05 to -0.16	0.989	0.034 <sup>a</sup>
Positive history of psychiatric illness	2.65	1.32 to 3.97	0.674	< 0.001 <sup>a</sup>
Positive history of chronic medical conditions	4.23	2.32 to 6.14	0.971	< 0.001 <sup>a</sup>
Depression	1.97	1.49 to 2.45	0.245	< 0.001 <sup>a</sup>
Anxiety	0.49	0.02 to 0.97	0.243	0.042 <sup>a</sup>

<sup>a</sup> Significant at 0.05.

the prevalence of suicidal thoughts to be between 7.4% and 35.6% (28, 29). This suggests that the rates of suicidal thoughts can vary significantly across different studies and contexts and may, in part, be influenced by the COVID-19 pandemic and the subsequent social distancing measures.

#### 5.4. Factors Associated with Suicidal Thoughts

Our study found that suicidal thoughts are significantly more prevalent among female students and those with a history of psychiatric or chronic medical illness. While the gender difference in suicidal

thoughts is not always consistent in the literature, when present, it is usually higher among female students (28, 30, 31). Some studies also associate being female with an increased risk of suicide attempts (31, 32). A diagnosed psychiatric condition is a significant risk factor for suicidal thoughts (29, 30, 33). However, our study found no significant correlation between suicidal thoughts and a family history of mental illness or financial issues.

On the other hand, suicidal thoughts were found to be less severe in married students. Research suggests that living alone or away from home and a lack of social support puts students at higher risk of suicidal

thoughts (28, 30). Additionally, satisfaction with the field of study and being in higher semesters were negatively associated with suicidal thoughts. This finding is consistent with previous research (27, 28). As medical students progress, they tend to balance their personal and professional lives better, which may contribute to improved mental health (34). Further qualitative studies could provide more insight into these observations.

Higher intensity of depression and anxiety were positively correlated with suicidal thoughts. This correlation has also been observed in previous studies. According to a recent meta-analysis, depression is one of the most important risk factors for suicidal thoughts in medical students (30). About 31.8% of students have sought help from mental health providers, and this frequency increases with the risk of suicide, as evidenced by 73.7% of those at the highest risk reporting at least one visit. At this university, free counseling services are provided at multiple centers around the city. Most students seek counseling services at advanced stages of mental health issues. Barriers to these services, such as self-reliance, high costs, and reliance on informal support networks, need further exploration, as they significantly influence service utilization (35).

### 5.5. Conclusions

This study offers valuable insights into the mental health of medical, dental, and pharmacy students, revealing a significant prevalence of mental disorders and suicidal thoughts. However, its cross-sectional design and single-center focus limit the generalizability of the results and prevent the establishment of causal relationships. The data also lacked detailed information about students' interactions with mental health professionals. Although measures were taken to reduce its impact, the convenience sampling in this study could also be a source of bias. Despite these limitations, the study highlights the urgent need for interventions to promote mental health in this population. Potential policies to address these issues include periodic screening, targeted access to counseling for those at higher risk of mental health issues, stress management programs, and curriculum modifications to reduce academic pressure.

### Footnotes

**Authors' Contribution:** H. J. contributed to study conceptualization, supervision, and reviewing and editing. M. M. contributed to study conceptualization,

data gathering, writing, reviewing, and editing. M. P. contributed to data gathering, writing, reviewing, and editing. M. B. contributed to data gathering and reviewing. Z. F. contributed to analysis, supervision, reviewing, and editing.

**Conflict of Interests Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Data Availability:** The dataset presented in the study is available on request from the corresponding author during submission or after publication.

**Ethical Approval:** All subjects gave their informed consent for inclusion before participating in the study. All experiments were conducted in accordance with relevant guidelines and regulations. This study has been reviewed and approved by the Ethics Committee of Shiraz University of Medical Sciences, with the code number: IR.SUMS.REC.1401.687.

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### References

1. Bussing A, Falkenberg Z, Schoppe C, Recchia DR, Poier D. Work stress associated cool down reactions among nurses and hospital physicians and their relation to burnout symptoms. *BMC Health Serv Res*. 2017;17(1):551. [PubMed ID: 28797258]. [PubMed Central ID: PMC5553651]. <https://doi.org/10.1186/s12913-017-2445-3>.
2. Mospan CM, Hess R, Blackwelder R, Grover S, Dula C. A two-year review of suicide ideation assessments among medical, nursing, and pharmacy students. *J Interprof Care*. 2017;31(4):537-9. [PubMed ID: 28388295]. <https://doi.org/10.1080/13561820.2017.1301900>.
3. Arrieta Vergara K, Cardenas SD, Martinez FG. [Symptoms of depression, anxiety and stress among dental students: Prevalence and related factors]. *Rev Colomb Psiquiatr*. 2013;42(2):173-81. ES. [PubMed ID: 26572812]. [https://doi.org/10.1016/S0034-7450\(13\)70004-0](https://doi.org/10.1016/S0034-7450(13)70004-0).
4. Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: A systematic review and meta-analysis. *JAMA*. 2016;316(21):2214-36. [PubMed ID: 27923088]. [PubMed Central ID: PMC5613659]. <https://doi.org/10.1001/jama.2016.17324>.
5. Shangraw AM, Silvers J, Warholak T, Vadieli N. Prevalence of anxiety and depressive symptoms among pharmacy students. *Am J Pharm Educ*. 2021;85(2):8166. [PubMed ID: 34283739]. [PubMed Central ID: PMC7926274]. <https://doi.org/10.5688/ajpe8166>.
6. Santabarbara J, Ozamiz-Etxebarria N, Idoiaga N, Olaya B, Bueno-Novitol J. Meta-analysis of prevalence of depression in dental students during COVID-19 pandemic. *Med (Kaunas)*. 2021;57(11). [PubMed ID: 34833496]. [PubMed Central ID: PMC8619286]. <https://doi.org/10.3390/medicina5711278>.



7. Ventriglio A, Watson C, Bhugra D. Suicide among doctors: A narrative review. *Indian J Psychiatry*. 2020;**62**(2):14-20. [PubMed ID: 32382169]. [PubMed Central ID: PMC197839]. [https://doi.org/10.4103/psychiatry.IndianJPsychiatry\\_767\\_19](https://doi.org/10.4103/psychiatry.IndianJPsychiatry_767_19).
8. Dutheil F, Aubert C, Pereira B, Dambrun M, Moustafa F, Mermillod M, et al. Suicide among physicians and health-care workers: A systematic review and meta-analysis. *PLoS One*. 2019;**14**(12). e0226361. [PubMed ID: 31830138]. [PubMed Central ID: PMC6907772]. <https://doi.org/10.1371/journal.pone.0226361>.
9. Abdollahi A, Hosseinian S, Nooripour R, Najafi M. Clarifying the roles of hardiness and hopelessness in relation to suicidal ideation among Malaysian undergraduate students. *Practice Clin Psychol*. 2017;**5**(4):243-50. <https://doi.org/10.29252/nirp.jpcc.5.4.243>.
10. Mohebian M, Dadashi M, Motamed N, Safdarian E. Evaluation of depression, anxiety, stress levels and stressors among dental students of Zanjan University of Medical Sciences in academic year of 2015-2016. *J Med Edu Development*. 2017;**10**(26):60-71. <https://doi.org/10.29252/edc.j.10.26.60>.
11. Jamshidi F, Mogehi S, Cheraghi M, Jafari SF, Kabi I, Rashidi L. A cross-sectional study of psychiatric disorders in medical sciences students. *Mater Sociomed*. 2017;**29**(3):188-91. [PubMed ID: 29109664]. [PubMed Central ID: PMC5644188]. <https://doi.org/10.5455/msm.2017.29.188-191>.
12. Mahdavinooor SMM, Rafiei MH, Mahdavinooor SH. Mental health status of students during coronavirus pandemic outbreak: A cross-sectional study. *Ann Med Surg (Lond)*. 2022;**78**:103739. [PubMed ID: 35571677]. [PubMed Central ID: PMC9091154]. <https://doi.org/10.1016/j.amsu.2022.103739>.
13. Nazari S, Ghazvini H, Seyedhosseini Tamijani SM, Rafeiee R. Increased suicide of Iranian resident physicians in the COVID-19 pandemic. *Int J High Risk Behav Add*. 2021;**11**(1). <https://doi.org/10.5812/ijhrba.117651>.
14. Gharebaghi R, Heidary F, Pourezat AA. Serial deaths of young trainee physicians in Iran during COVID-19 pandemic; messages to policy makers. *Front Health Serv*. 2022;**2**:777065. [PubMed ID: 36925768]. [PubMed Central ID: PMC1012792]. <https://doi.org/10.3389/frhs.2022.777065>.
15. Sartipi M, Nedjat S, Mansournia MA, Baigi V, Fotouhi A. Assets as a socioeconomic status index: Categorical principal components analysis vs. Latent class analysis. *Arch Iran Med*. 2016;**19**(11):791-6. [PubMed ID: 27845549].
16. Lovibond SH, Lovibond PF. *Manual for the depression anxiety stress scales*. 5. 2nd ed. Australia: Psychol; 2011. <https://doi.org/10.1037/t01004-000>.
17. Kakemam E, Navvabi E, Albelbeisi AH, Saeedikia F, Rouhi A, Majidi S. Psychometric properties of the Persian version of depression Anxiety Stress Scale-21 items (DASS-21) in a sample of health professionals: A cross-sectional study. *BMC Health Serv Res*. 2022;**22**(1):111. [PubMed ID: 35078477]. [PubMed Central ID: PMC8789546]. <https://doi.org/10.1186/s12913-022-07514-4>.
18. Beck AT, Steer RA, Ranieri WF. Scale for Suicide Ideation: Psychometric properties of a self-report version. *J Clin Psychol*. 1988;**44**(4):499-505. [PubMed ID: 3170753]. [https://doi.org/10.1002/1097-4679\(198807\)44:4<499::aid-jclp2270440404>3.0.co;2-6](https://doi.org/10.1002/1097-4679(198807)44:4<499::aid-jclp2270440404>3.0.co;2-6).
19. Esfahani M, Hashemi Y, Alavi K. Psychometric assessment of Beck scale for suicidal ideation (BSSI) in general population in Tehran. *Med J Islam Repub Iran*. 2015;**29**:268. [PubMed ID: 26793659]. [PubMed Central ID: PMC4715388].
20. Lin YK, Saragih ID, Lin CJ, Liu HL, Chen CW, Yeh YS. Global prevalence of anxiety and depression among medical students during the COVID-19 pandemic: A systematic review and meta-analysis. *BMC Psychol*. 2024;**12**(1):338. [PubMed ID: 38858700]. [PubMed Central ID: PMC1163725]. <https://doi.org/10.1186/s40359-024-01838-y>.
21. Peng P, Hao Y, Liu Y, Chen S, Wang Y, Yang Q, et al. The prevalence and risk factors of mental problems in medical students during COVID-19 pandemic: A systematic review and meta-analysis. *J Affect Disord*. 2023;**321**:167-81. [PubMed ID: 36341802]. [PubMed Central ID: PMC9613786]. <https://doi.org/10.1016/j.jad.2022.10.040>.
22. Lasheras I, Gracia-Garcia P, Lipnicki DM, Bueno-Notivol J, Lopez-Anton R, de la Camara C, et al. Prevalence of anxiety in medical students during the COVID-19 pandemic: A rapid systematic review with meta-analysis. *Int J Environ Res Public Health*. 2020;**17**(18). [PubMed ID: 32927871]. [PubMed Central ID: PMC7560147]. <https://doi.org/10.3390/ijerph17186603>.
23. Kunwar D, Risal A, Koirala S. Study of depression, anxiety and stress among the medical students in two Medical Colleges of Nepal. *Kathmandu Univ Med J (KUMJ)*. 2016;**14**(53):22-6. [PubMed ID: 27892436].
24. Jordan RK, Shah SS, Desai H, Tripi J, Mitchell A, Worth RG. Variation of stress levels, burnout, and resilience throughout the academic year in first-year medical students. *PLoS One*. 2020;**15**(10). e0240667. [PubMed ID: 33057410]. [PubMed Central ID: PMC7561113]. <https://doi.org/10.1371/journal.pone.0240667>.
25. Melaku L, Mossie A, Negash A. Stress among medical students and its association with substance use and academic performance. *J Biomed Edu*. 2015;**2015**:1-9. <https://doi.org/10.1155/2015/149509>.
26. Mao Y, Zhang N, Liu J, Zhu B, He R, Wang X. A systematic review of depression and anxiety in medical students in China. *BMC Med Educ*. 2019;**19**(1):327. [PubMed ID: 31477124]. [PubMed Central ID: PMC6721355]. <https://doi.org/10.1186/s12909-019-1744-2>.
27. Nakhostin-Ansari A, Akhlaghi M, Etesam F, Sadeghian MH. Suicidal ideation and its associated factors in medical, dental, and pharmacy students: A cross-sectional study during COVID-19 pandemic. *Psychiatry J*. 2022;**2022**:8139351. [PubMed ID: 36478735]. [PubMed Central ID: PMC9722308]. <https://doi.org/10.1155/2022/8139351>.
28. Frajerman A, Chaumette B, Krebs MO, Morvan Y. Mental health in medical, dental and pharmacy students: A cross-sectional study. *J Affect Disord Rep*. 2022;**10**:100404. [PubMed ID: 35992770]. [PubMed Central ID: PMC9378210]. <https://doi.org/10.1016/j.jadr.2022.100404>.
29. Osama M, Islam MY, Hussain SA, Masroor SM, Burney MU, Masood MA, et al. Suicidal ideation among medical students of Pakistan: A cross-sectional study. *J Forensic Leg Med*. 2014;**27**:65-8. [PubMed ID: 25287803]. <https://doi.org/10.1016/j.jflm.2014.08.006>.
30. Seo C, Di Carlo C, Dong SX, Fournier K, Haykal KA. Risk factors for suicidal ideation and suicide attempt among medical students: A meta-analysis. *PLoS One*. 2021;**16**(12). e0261785. [PubMed ID: 34936691]. [PubMed Central ID: PMC8694469]. <https://doi.org/10.1371/journal.pone.0261785>.
31. Marcon G, Massaro Carneiro Monteiro G, Ballester P, Cassidy RM, Zimmerman A, Brunoni AR, et al. Who attempts suicide among medical students? *Acta Psychiatr Scand*. 2020;**141**(3):254-64. [PubMed ID: 31797353]. <https://doi.org/10.1111/acps.13137>.
32. Tsegay L, Abraha M, Ayano G. The global prevalence of suicidal attempt among medical students: A systematic review and meta-analysis. *Psychiatr Q*. 2020;**91**(4):1089-101. [PubMed ID: 32789601]. <https://doi.org/10.1007/s1126-020-09805-7>.
33. Rau T, Plener P, Kliemann A, Fegert JM, Allroggen M. Suicidality among medical students - a practical guide for staff members in medical schools. *GMS Z Med Ausbild*. 2013;**30**(4):Doc48. [PubMed ID: 24282451]. [PubMed Central ID: PMC3839076].
34. Wolf TM, Kissling GE, Burgess LA. Lifestyle characteristics during medical school: A four-year cross-sectional study. *Psychol Rep*. 1986;**59**(1):179-89. [PubMed ID: 3737800]. <https://doi.org/10.2466/pr0.1986.59.1.179>.
35. Han J, Batterham PJ, Calear AL, Ma J. Seeking professional help for suicidal ideation: A comparison between Chinese and Australian university students. *Psychiatry Res*. 2018;**270**:807-14. [PubMed ID: 30551329]. <https://doi.org/10.1016/j.psychres.2018.10.080>.