FACTORS ASSOCIATED WITH DEPRESSION, ANXIETY, AND STRESS AMONG MEDICAL COLLEGE STUDENTS

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Academic pressure, stress, and associated factors are pervasive throughout education. Lately, depression, anxiety, and stress emerged as alarming mental health issues among health science students. A cross-sectional descriptive study was conducted among 2,064 students at Can Tho Medical College to determine the prevalence of depression, anxiety, and stress, along with associated factors. Data were collected online using the DASS-21 questionnaire via Google Forms. The prevalence rates of depression, anxiety, and stress among college students were 52.4%, 73.1%, and 58.8%, respectively. Factors associated with these conditions included gender, body satisfaction, daily smartphone use, primary smartphone activities, satisfaction with academic performance, ease of forming friendships, and presence of close friends. As depression, anxiety, and stress were significant concerns among medical college students, educators should implement screening programs and develop strategies to improve and enhance students' mental health.

Keywords: Medical College students, depression, anxiety, stress, DASS-21.

I. INTRODUCTION

Mental health is a field that warrants significant attention among today's youth.[1]degree of appearance stress A report indicated that the prevalence of mental disorders among children and adolescents globally is approximately 10 - 20%.[2] Students, who constituted a significant portion of young adults in the community, were particularly susceptible to mental disorders because many psychological conditions tend to emerge at this age.[3] In this group, health science students were considered to have a higher rate of depression, anxiety, and stress compared to other student groups of the same age.[3-6]

The transition from high school to college and university involves significant lifestyle changes that necessitate students' flexibility and adaptation.[3,4] Students could adjust to new living environments, people, educators and friends.[3,6] Health science training programs, in particular, impose additional challenges due to their extended training periods, increased credit requirements, and rigorous theoretical and practical components.[3] These demands contribute to a higher risk of depression, anxiety, and stress among health science students.

Moreover, to become fully qualified healthcare professionals, medical college and university programs require students to complete clinical internships and hospital

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rotations, interacting with diverse diseases and patients of all ages.[4] These experiences may increase the risk of depression, anxiety, and stress.[4]

In recent years, the mental health of health science students at universities in Vietnam has garnered attention. However, to the authors' knowledge, no study has been conducted on medical students. Despite having a lighter academic workload and shorter training duration compared to university students, medical college students may still face similar mental health challenges. This study was conducted to assess the prevalence of and factors related to depression, anxiety, and stress among health science students at medical colleges, and to enhance the understanding of this issue and to provide additional reference materials.

II. MATERIALS AND METHODS

1. Subjects

Inclusion criteria: Students enrolled at Can Tho Medical College from the first to third year, from December 2023 to April 2024, consented to participate in the study.

Exclusion criteria: Students who had withdrawn or were on academic leave as decided by the Principal, and students who did not complete the required sections of the form.

2. Methods

Research design

Cross-Sectional Descriptive Study.

Sample size

The sample size was calculated using the stratified random sampling method across 7 training programs for student subjects, employing the Sample Size software developed by Lwanga with the sample size estimation formula applied as follows[7]:

$$n \geq \frac{Z^2_{1-\alpha/2} \sum_{h=1}^{L} \frac{N_h^2 P_h(1 - P_h)}{W_h}}{N^2 d^2 + Z^2_{1-\alpha/2} \sum_{h=1}^{L} N_h P_h(1 - P_h)}$$

n: Minimum sample size. Z: Confidence coefficient, α=0.05, $Z^2_{1-\alpha/2}$=1.96. d: Margin of error 5%.

L: Number of strata. In this study, the researchers divided by training programs, resulting in 7 strata corresponding to the 7 programs offered at the institution.

P_h: Proportion of depression, anxiety, and stress. According to Nam V.T.P., the proportions of depression, anxiety, and stress among medical students were 53.4%, 59.5%, and 48.0%, respectively[3]. The researchers chose p = 53.4%.

N_h: Number of students in each stratum. For the programs Medicine, Pharmacy, Laboratory Technology, Nursing, Rehabilitation, Prosthodontics, and Midwifery, the respective student counts were N_{h1} = 129, N_{h2} = 1595, N_{h3} = 376, N_{h4} = 1209, N_{h5} = 161, N_{h6} = 155, N_{h7} = 96.

W_h: Weight of students in each stratum as a percentage of the total number of students across the 7 strata. The percentages were W_{h1} = 3.47, W_{h2} = 42.86, W_{h3} = 10.1, W_{h4} = 32.49, W_{h5} = 4.33, W_{h6} = 4.17, W_{h7} = 2.58, corresponding to the programs Medicine, Pharmacy, Laboratory Technology, Nursing, Rehabilitation, Prosthodontics, and Midwifery, respectively.

Table 1. Distribution of Survey Sample Size by Training Program

Training Program	Population size (n)	p-value	Weight (%)	Minimum Required Sample Size	Actual Sample Size
Medicine	129	0.534	3.47	12	82

Training Program	Population size (n)	p-value	Weight (%)	Minimum Required Sample Size	Actual Sample Size
Pharmacy	1,595	0.534	42.86	149	999
Laboratory Technology	376	0.534	10.1	35	204
Nursing	1,209	0.534	32.49	113	533
Rrehabilitation	161	0.534	4.33	15	80
Prosthodontics	155	0.534	4.17	14	84
Midwifery	96	0.534	2.58	9	82
Total	**3,721**		**100**	**347**	**2,064**

Thus, the minimum required sample size was 347 students. In actuality, the researchers collected data from 2,064 students.

Sampling Method: A purposive sampling method was employed. An online questionnaire was developed, and the researchers selected all students who met the inclusion criteria as the study population. Invitations to participate, along with the online questionnaire, were sent to the email addresses of all eligible students, which were provided by the academic affairs office.

Research instruments

The Research instrument has two parts:

Part 1: The characteristics of the research subjects included the year of the training program, gender, body satisfaction, hours of smartphone use, primary smartphone activities, Grade Point Average (GPA), exam retake, satisfaction with academic performance, ease of forming new friendships, and presence of close friendships.

Part 2: Depression, anxiety, and stress were assessed using the Depression, Anxiety, and Stress Scale (DASS), originally developed by Lovibond et al. in 1995 with 42 items (DASS-42) and later shortened to 21 items in 1997 (DASS-21).[8] The instrument consisted of three subscales: depression, anxiety, and stress, each containing 7 items. Depression included items 3, 5, 10, 13, 16, 17, and 21; anxiety included items 2, 4, 7, 9, 15, 19, and 20; and stress included items 1, 6, 8, 11, 12, 14, and 18. Each item was scored on a 4-point Likert scale from 0 to 3 ("0 - Did not apply to me at all, 1 - Applied to me to some degree, or some of the time, 2 - Applied to me to a considerable degree, or a good part of the time, 3 - Applied to me very much, or most of the time").[8] Scores for each subscale were obtained by summing the relevant items. Since the DASS-21 was a shortened version, the final score for each subscale was doubled and evaluated based on its severity index. The scale had been translated into Vietnamese and validated by Le M.T.H. et al. on Vietnamese adolescents, showing high reliability (Cronbach's alpha) for each subscale (DASS-21 Depression: 0.835; DASS-21 Anxiety: 0.737; and DASS-21 Stress: 0.761). The overall score across the 21 items also demonstrated high reliability (Cronbach's alpha = 0.906).[2]

Data collect and Analysis

Data were collected using a designed structured questionnaire. Students were invited to participate via personal email addresses provided by the college, and those who fully completed the online collection form through

Table 2. Level of Depression, Anxiety, and stress[2]

Subscale	Depression	Anxiety	Stress
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Average	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely Severe	≥ 28	≥ 20	≥ 34

Google Forms were considered to have agreed to participate.

The collected data were processed and analyzed using SPSS version 20.0 software. Descriptive statistics were employed to present the frequencies and percentages of personal characteristics, as well as the prevalence of depression, anxiety, and stress among the respondents. Univariate logistic regression was employed to assess the relationship of each factor at a significance level of $p < 0.05$. Subsequently, factors with $p < 0.2$ were included in the multivariate logistic regression model. Significant factors were identified at a threshold of $p < 0.05$.

3. Research ethics

This study follows the ethical principles stated in the Declaration of Helsinki, and received approval from the Research Proposal Review Board of Can Tho Medical College, as per Decision No. 493/QĐ-CĐYT dated November 2, 2023.[9]

An invitation to participate in the study, along with a link to the online survey, was sent to all students. Students consented to participate by accessing the link and completing the questionnaire. Students had the right to decline participation and not respond to the survey without impacting their academic rights or standing at the institution.

III. RESULTS

1. Demographic profiles of the respondents

Over two-thirds of the students were female (75.4%). Of the students, 32.3% were dissatisfied with their appearance, and 67.1% used smartphones for six or more hours daily, primarily on social media (65.5%).

In terms of academic standing, first-year, second-year, and final-year students made up 34.9%, 35.2%, and 29.9%, respectively. Academic performance was distributed as follows: 8.2% excellent, 21.7% very good, 44.3% good, 22.8% average, and 3% poor. Additionally, 8.7% had to retake exams, and 43.4% were dissatisfied with their results.

Socially, 36.7% found it difficult to make new friends, and 16.5% did not have close friends.

2. Depression, anxiety, and stress among medical college students

The prevalence rates of depression, anxiety, and stress among college students were 52.4%, 73.1%, and 58.8%, respectively. Of these, severe and very severe depression account for 11.97% and 19.18%; severe and very severe anxiety account for 4.94% and 19.24%; and severe and very severe stress account for 12.9% and 16.52%. Among the 1,081 students with depression, the distribution across Medicine, Pharmacy, Laboratory Technology,

Nursing, Rehabilitation, Prosthodontics, and Midwifery was 4.07%, 50.23%, 9.53%, 25.16%, 3.42%, 3.89%, and 3.7%, respectively. For the 1,508 students with anxiety, the distribution was 3.78%, 49.27%, 10.21%, 25.27%, 3.71%, 3.65%, and 4.11%. Among the 1,213 students with stress, the distribution was 3.63%, 49.96%, 10.22%, 25.31%, 2.88%, 4.04%, and 3.96%.

Table 3. Depression, anxiety, stress among medical college students

States	Depression		Anxiety		Stress	
	n	%	n	%	n	%
Normal	983	47.63	556	26.94	851	41.23
Mild	247	11.97	102	4.94	266	12.90
Moderate	198	9.59	256	12.40	364	17.64
Severe	240	11.63	753	36.48	242	11.72
Extremely Severe	396	19.18	397	19.24	341	16.52

3. Factors associated with depression, anxiety, and stress among medical college students

Multivariate binary logistic regression analysis showed 6 factors were associated with depression, anxiety, and stress in medical college students, and the following in Table 4 and Table 5:

Table 4. Factors associated with depression, anxiety, and stress among students

Factors	Depression			Anxiety			Stress		
	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust
Gender									
Female	-	-	-	-	-	-	947 (60.8)	610 (39.2)	1.40** (1.13 - 1.74)
Male	-	-	-	-	-	-	266 (52.5)	241 (47.5)	1
Body satisfaction									
No	452 (67.9)	214 (23.1)	2.01** (1.63 - 2.47)	556 (83.5)	110 (16.5)	1.99** (1.56 - 2.55)	480 (72.1)	186 (27.9)	1.99** (1.62 - 2.45)
Yes	629 (45.0)	769 (55.0)	1	952 (68.1)	446 (33.9)	1	733 (52.4)	665 (47.6)	1

Factors	Depression			Anxiety			Stress		
	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust
Daily smartphone usage hours									
≥ 6 hours	782 (56.5)	603 (43.5)	1.48** (1.22 - 1.80)	1055 (76.2)	330 (23.8)	1.39** (1.13 - 1.72)	874 (63.1)	511 (36.9)	1.50** (1.23 - 1.82)
< 6 hours	299 (44.0)	380 (50.0)	1	453 (66.7)	226 (33.3)	1	339 (49.9)	340 (50.1)	1
Primary smartphone activities									
Study	160 (42.4)	217 (57.6)	0.73* (0.57 - 0.93)	245 (65.0)	132 (35.0)	0.67** (0.52 - 0.86)	178 (47.2)	199 (52.8)	0.61** (0.48 - 0.78)
News reading	33 (34.0)	64 (66.0)	0.43** (0.27 - 0.68)	53 (54.6)	44 (45.4)	0.39** (0.25 - 0.60)	37 (38.1)	60 (61.9)	0.38** (0.25 - 0.60)
Gaming	44 (62.0)	27 (38.0)	1.26 (0.75 - 2.11)	55 (77.5)	16 (22.5)	0.97 (0.54 - 1.75)	46 (64.8)	25 (35.2)	1.14 (0.68 - 1.93)
Others	88 (52.7)	79 (47.3)	0.90 (0.64 - 1.27)	115 (68.9)	52 (31.1)	0.70 (0.49 - 1.00)	90 (53.9)	77 (46.1)	0.71 (0.51 - 1.00)
Social media	756 (55.9)	596 (44.1)	1	1040 (76.9)	312 (23.1)	1	862 (63.8)	490 (36.2)	1

**p-value < 0.05, and **p-value < 0.01*

Female students were at a higher risk of stress compared to male students. Additionally, students who were dissatisfied with their appearance; and used smartphones for six or more hours daily were at an increased risk of depression, anxiety, and stress. Conversely, students who used their phones for studying and reading news had a lower risk of depression, anxiety, and stress compared to those who use their phones for social media (Table 4).

Students who were dissatisfied with their academic performance are at a higher risk of depression and anxiety (Table 5).

Furthermore, students who had difficulty forming new friendships, without close friends were at a higher risk of depression and stress.

IV. DISCUSSION

1. Depression, anxeity, and stress among medical college students

The prevalence rates of depression, anxiety, and stress among college students were 52.4%, 73.1%, and 58.8%, respectively. These results were different compared with Vu Thai Phuong

Table 5. Factors associated with depression, anxiety, and stress among students (continued)

Factors	Depression			Anxiety			Stress		
	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust	Yes n (%)	No n (%)	OR (95% CI) Adjust
Satisfaction with academic performance									
No	550 (61.4)	346 (38.6)	1.42** (1.18 - 1.72)	699 (78.0)	197 (22.0)	1.26* (1.02 - 1.55)	-	-	-
Yes	531 (45.5)	637 (54.5)	1	809 (69.3)	359 (30.7)	1	-	-	-
Ease of forming new friendships									
No	493 (65.1)	264 (34.9)	1.90** (1.57 - 2.31)	602 (79.5)	155 (20.5)	1.48** (1.19 - 1.84)	533 (79.4)	224 (29.6)	1.89** (1.55 - 2.30)
Yes	588 (45.0)	719 (55.0)	1	906 (69.3)	401 (30.7)	1	680 (52.0)	627 (48.0)	1
Presence of close friendships									
No	227 (66.8)	113 (33.2)	1.70** (1.31 - 2.20)	-	-	-	229 (67.4)	111 (32.6)	1.37** (1.06 - 1.78)
Yes	854 (49.5)	870 (50.5)	1	-	-	-	984 (57.1)	740 (42.9)	**1**

**p-value < 0.05, and **p-value < 0.01*

Nam's study (2022) on 783 medical students, showing depression, anxiety, and stress rates of 53.4%, 59.5%, and 48.0%, respectively.[3] Tran Van Thien's study (2024) on 422 first-year students reported 70.9%, 77.7%, and 53.6% for depression, anxiety, and stress.[6] Similarly, a study of 597 medical students at Benda University, India (2022), found 88.8%, 82.6%, and 82.7% for depression, anxiety, and stress.[5]

These findings highlight the need for significant attention to the mental health of health science students. Educators should implement mental health screening programs to ensure early detection and timely intervention, aiding students in managing academic pressures, meeting graduation requirements, and adapting to their future careers.

2. Factors associated with depression, anxiety, and stress among students

Gender, body satisfaction, daily hours of smartphone use, primary smartphone activities, satisfaction with academic performance, ease of forming new friendships, and the presence of close friendships were identified as factors associated with depression, anxiety, and stress

among medical college students.

Female students had a higher risk of stress than male students, with an OR of 1.4 (95% CI: 1.13 - 1.74). Similar results have been found in multiple studies.[4,6] Female students may be more sensitive, prone to overthinking, and have poorer psychological control, making them more susceptible to external influences. Mental health interventions should be individualized. Additionally, student organizations should enhance extracurricular activities and provide recreational and psychological counselling services for students.

Students dissatisfied with their appearance had a higher risk of depression, anxiety, and stress compared to those who were satisfied, with ORs of 2.01, 1.99, and 1.99, respectively. The studies by Vu Thai Phuong Nam (2022) and Lim (2023) also yielded similar results, indicating that appearance was significantly related to students' mental health.[1,3] This suggests that appearance-related insecurities may hinder social integration and contribute to negative self-perception due to external judgments. Therefore, universities, educators, and families should pay close attention to students' perceptions of their appearance and develop clubs that enhance students' external appearance, such as makeup, fashion, and fitness clubs.

Students who used smartphones for six or more hours daily had higher risks of depression, anxiety, and stress, with ORs of 1.48, 1.39, and 1.50, respectively, compared to those who used them for less than six hours daily. Additionally, students who used smartphones for studying and reading news had lower risks of depression, anxiety, and stress than those who used them for social media, with ORs of 0.73, 0.67, 0.61, and 0.43, 0.39, 0.38, respectively. The significant development and benefits of the internet and online platforms were undeniable. However, numerous studies indicated that using smartphones for social media could lead to social isolation, reduced real-world interactions, increased feelings of loneliness, and higher risks of depression, anxiety, and stress among students.[4] Families and educators should help students understand the harmful effects of excessive smartphone and social media use and encourage balanced time management to improve mental health.

Students dissatisfied with academic performance had higher risks of depression and anxiety compared to those who were satisfied with ORs of 1.42 and 1.26, respectively. These results were consistent with Mofatteh's report.[4] This may be due to students spending extensive time studying but not achieving the expected results. Additionally, academic performance could impact graduation and job prospects, increasing the risk of depression and anxiety. Academic advisors should investigate the reasons for students' low exam scores, provide encouragement, and offer appropriate study methods.

Students who had difficulty forming new friendships had higher risks of depression, anxiety and stress compared to those who formed friendships easily, with ORs of 1.9, 1.48 and 1.89. Vu Thai Phuong Nam's and Tran Van Thien's study yielded similar results, with ORs of 2.0, 1.73, 1.52, and 2.94, 3.3, 3.07.[3,6] This may be due to some students being introverted or apprehensive about communication. Student organizations should organize more group activities to enhance teamwork skills and interactions, helping students gain confidence in socializing and making friends.

Students without close friends had higher risks of depression and stress compared to those with close friends, with ORs of 1.7 and

1.37, respectively. A study conducted at the University of Medicine and Pharmacy, National Hanoi University, also found that close friends and friend groups helped to reduce the risk of depression and stress among students.[3] Close friends shared joys and sorrows and supported each other through life's challenges. Studies showed that valuable friendships positively impact happiness, reduce stress, and mitigate mental health issues.[10] Families and educators should encourage students to develop healthy, close friendships. Implementing effective group teaching methods can enhance teamwork skills, boost academic performance, and strengthen peer relationships.

Limitations of the study

The study was conducted during the period when students were awaiting their semester exam results, which may have elevated the rates of depression, anxiety, and stress above normal levels. Furthermore, like all self-assessment surveys, the questionnaire does not equate to a diagnosis of mental disorders.

Future research should be conducted at different times and include longitudinal follow-ups, as well as incorporate qualitative studies to understand better the causal relationships identified in this research. Organizing screening programs for mental health issues and conducting longitudinal studies are essential for managing academic stress and improving the quality of the learning environment for health science students.

V. CONCLUSION

The prevalence rates of depression, anxiety, and stress among college students are 52.4%, 73.1%, and 58.8%, respectively. Factors associated with these conditions include gender, body satisfaction, daily smartphone use, primary smartphone activities, satisfaction with academic performance, ease of forming friendships, and presence of close friends.

Medical colleges should prioritize mental health by implementing screening programs. Educators should use more active, group-based teaching methods. Student organizations should create extracurricular clubs to strengthen social relationships, foster community, and enhance soft skills.

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