

Prevalence and associated factors of depressive symptoms among first-year medical students at Hue University of Medicine and Pharmacy, Vietnam

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Received: 30 September 2025 **Revised:** 19 January 2026 **Accepted:** 20 January 2026 **Available online:** September 2026

DOI: 10.55131/jphd/2026/240315

ABSTRACT

Recent international evidence reveals a high burden of mental disorders among first-year students and highlights negative trajectories during medical training. The WHO-5 Well-Being Index is a concise, validated tool with robust measurement properties for academic settings. In Vietnam, previous studies have predominantly utilized the DASS-21, with limited evidence on WHO-5 screening for first-year medical students. This study aims to describe the prevalence of depressive symptoms (WHO-5) and analyze associated factors with a specific focus on gender differences. A cross-sectional study was conducted among 405 first-year medical and preventive medicine students (July–December 2024). Signs of depressive symptoms were defined as a WHO-5 score < 13. Descriptive statistics, Chi-square tests, and multivariable logistic regression were performed. The mean WHO-5 score was 14.2 (SD = 5.7); 36.5% of participants exhibited signs of depressive symptoms. Female students had a higher risk than males (AOR = 1.538; 95% CI = 1.010–2.342). This is the first study to apply the WHO-5 to first-year medical students in Central Vietnam, revealing a considerable proportion with depressive symptoms and significant gender disparities. Findings highlight the need for early WHO-5 screening and tailored interventions, especially targeting female students.

Keywords:

mental health, depressive symptoms, first-year students, medical students, WHO-5 Well-Being Index, Hue City

Citation:

Bao Tran Nguyen, Binh Thang Tran, Cao Khoa Dang, Thi Tra My Tran, Nu Hong Duc Vo. Prevalence and associated factors of depressive symptoms among first-year medical students at Hue University of Medicine and Pharmacy, Vietnam. *J Public Hlth Dev.* 2026;24(3): 214-227 (<https://doi.org/10.55131/jphd/2026/240315>)

INTRODUCTION

According to the World Health Organization, mental health is a state in which individuals can fulfill their potential, cope with the stressors of daily life, work productively, and make a positive contribution to their communities.¹ This perspective emphasizes that mental health is not merely the absence of mental disorders but a crucial element for effective individual and societal functioning.

In recent years, mental health problems among university students have emerged as a global public health concern, with first-year students being particularly affected. The early phase of university life is often accompanied by academic pressure, social adjustment, and separation from familiar support systems, all of which may adversely influence psychological well-being.^{2, 3} Data from the WHO World Mental Health International College Student initiative (2017–2023), involving more than 70,000 students across 18 countries, indicate that over one-third of first-year students experience at least one mental disorder, leading to notable impairments in academic performance and social functioning.⁴

Within this population, medical students appear to face an even higher burden. Earlier studies in Vietnam and other countries, including a national survey conducted in South Korea, have reported elevated risks of depressive symptoms among junior medical students compared with those in later academic years.^{5, 6} More recent Vietnamese evidence has continued to document substantial mental health challenges among medical students, with post-pandemic prevalence estimates of depression exceeding 40% in some settings and large-scale surveys using the DASS-21 reporting high levels of stress, anxiety, and depression. Consistently, female medical students have been shown to report higher

levels of depressive and anxiety symptoms than males, highlighting the importance of considering gender-related vulnerabilities in medical education.^{7, 8}

The transition into adulthood and higher education often coincides with multiple stressors, including relocation, financial concerns, and increasing academic demands. Recent research suggests that psychological processes such as emotion regulation and cognitive flexibility may play a central role in shaping students' mental health outcomes, beyond traditional socio-demographic characteristics alone.⁹

In Vietnam, undergraduate medical training typically spans six years and is widely regarded as academically demanding. International studies have consistently shown that students in health-related disciplines are more likely to experience stress and depressive symptoms than their peers in non-medical fields.^{10, 11} Despite this growing body of evidence, the WHO-5 Well-Being Index—a brief and internationally validated screening tool—has been used relatively infrequently in Vietnamese student populations, even though its reliability and cross-cultural applicability are well established.^{12, 13}

Research gap and novelty: Most Vietnamese studies published between 2014 and 2024 have relied on the DASS-21 and have commonly included students from multiple academic years, limiting the ability to capture challenges specific to the first year of medical training. To our knowledge, no previous study has applied the WHO-5 to screen for depressive symptoms among first-year medical students in Central Vietnam. Moreover, although gender differences in student mental health have been widely reported internationally, local evidence remains limited.

This study was therefore conducted to describe the prevalence of depressive

symptoms, as assessed by the WHO-5 Well-Being Index, and to examine associated socio-demographic factors among first-year medical students at Hue University of Medicine and Pharmacy. The specific research questions were: (1) What is the prevalence of depressive symptoms among first-year medical students assessed by the WHO-5 scale? and (2) Which socio-demographic factors, especially gender, are associated with the risk of depressive symptoms in this group?

METHODS

Study design and settings

This cross-sectional study was conducted from July to December 2024 at Hue University of Medicine and Pharmacy, Hue City, Central Vietnam. The study focused on first-year students enrolled in the General Medicine and Preventive Medicine programs.

Participants and sampling

Inclusion criteria were (1) first-year students who provided informed consent and (2) residency in Hue City during the study period. Exclusion criteria were (1) absence on survey dates or (2) incomplete responses to two or more WHO-5 items. The sample size was estimated using a single population proportion formula:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{d^2}$$

n = minimum required sample size

Z = 1.96 at a 95% Confidence Interval (CI)

d = margin of error, 5%

p = proportion of poor mental well-being among Vietnamese medical students, 63.7%

The sample size was calculated using a previously reported prevalence of poor mental well-being among Vietnamese medical students of 63.7%, as documented by Huynh Ho Ngoc Quynh et al. (2020).¹⁴ Using a 95% confidence level and a margin

of error of 5%, the minimum required sample size was estimated at 355 participants. To account for potential non-response and incomplete data, a total of 503 first-year medical students were invited to participate in the study. Of these, 405 students returned questionnaires that met the inclusion criteria, resulting in a response rate of 78.9%. Non-participation was primarily attributable to student absence on scheduled survey days or failure to complete two or more items of the WHO-5 questionnaire, which rendered the responses invalid for analysis. In addition, given the sensitive nature of mental health topics, some students chose not to participate.

A convenience sampling method was applied, as all eligible first-year students present during the data collection period were invited. While this approach facilitated data collection within an academic setting, it may limit the representativeness of the sample and should be considered when interpreting the findings.

Instruments

A self-administered questionnaire was used, consisting of two sections: socio-demographic factors and the WHO-5 Well-Being Index (WBI).

Part 1: Socio-demographic factors

This section included gender, ethnicity and religion; place of residence before entering university; parental marital status; occupation and education level of father/stepfather/adoptive father; occupation and education level of mother/stepmother/adoptive mother; presence of siblings; generations living together in the same household prior to university.

Part 2: WHO-5 Well-Being Index (WBI)

In our study, signs of depressive symptoms were assessed using the WHO-5 Well-Being Index, a brief self-report instrument designed to capture subjective mental well-being. The WHO-5 was first

introduced in February 1998 in Stockholm as part of a project aimed at measuring overall well-being in primary healthcare settings.¹⁵ Since its introduction, the scale has been translated into more than 30 languages and has been widely employed in diverse research and clinical contexts worldwide. Although the WHO-5 was originally developed as a non-invasive tool to assess positive aspects of well-being through five simple items, subsequent research has demonstrated its utility as a screening instrument for depressive symptoms, with consistently high sensitivity and specificity.^{12, 13} Evidence supporting the applicability of the WHO-5 in Vietnam was provided by a comprehensive study conducted among Vietnamese students by Tran Quanh Minh Anh et al. (2021). The instrument demonstrated excellent internal consistency in that study (Cronbach's $\alpha = 0.91$). Construct validity was further supported by confirmatory factor analysis, which revealed satisfactory fit indices: $\chi^2/df = 0.84$, GFI = 0.99, TLI = 0.98, CFI = 0.98, and RMSEA = 0.08 (90% CI = [0.07; 0.09]).¹⁶

The scale consists of five items evaluating one's mental health over the past two weeks. Each item is rated on a six-point Likert scale (0 = at no time; 1 = some of the time; 2 = less than half of the time; 3 = more than half of the time; 4 = most of the time; 5 = all of the time). The total score ranges from 0 to 25, with higher scores indicating better mental well-being. Based on the systematic review by Christian Winther Topp et al. (2015), a score below 13 on the WHO-5 has been widely used as a cut-off point for identifying individuals with signs of depressive symptoms.¹² Based on this criterion, participants' mental health status was categorized into two groups:

With signs of depressive symptoms:
< 13 points

Without signs of depressive symptoms: ≥ 13 points

Data collection procedure

The questionnaire was administered in a controlled classroom setting with a clear explanation of the study purpose and assurances of confidentiality. Assistance was provided for any items requiring clarification. Questionnaires with two or more missing WHO-5 items were excluded from the analysis to ensure data integrity.

Statistical analysis

Statistical analysis was performed using SPSS software (version 20). To profile the participants and report WHO-5 results, descriptive measures such as means, standard deviations, frequencies, and percentages were utilized. The relationship between categorical variables and signs of depressive symptoms was assessed via Chi-square tests. Multivariable logistic regression analysis was conducted to estimate adjusted odds ratios (AOR) and 95% confidence intervals (CI) for factors associated with depressive symptoms.

An a priori adjustment strategy was applied, whereby all socio-demographic variables collected in the study were simultaneously entered into the multivariable logistic regression model as covariates. These variables included age, sex, ethnicity, religion, place of residence before entering university, current living arrangement, parental marital status, parental occupation, parental educational level, sibling status, and household generational structure.

The regression model was limited to socio-demographic variables, as psychosocial factors such as academic stress, sleep quality, and financial strain were not assessed in the original study design. The absence of these variables may have reduced the explanatory capacity of the model and is therefore acknowledged as

a methodological limitation. A two-sided p-value < 0.05 was considered statistically significant for all analyses.

Ethical approval

The study was approved by the Ethics Committee in Biomedical Research, University of Medicine and Pharmacy, Hue University (Approval Code: H2024/579; Approval date: October 11th, 2024). Participation was voluntary, and written informed consent was obtained from all respondents. Confidentiality and anonymity were maintained throughout data collection and analysis.

Sample characteristics

A total of 405 first-year students participated in this study, with a response rate of 78.9%. The gender distribution was 55.6% male and 44.4% female. The majority belonged to the Kinh ethnic group (95.6%) and reported no religious affiliation (85.2%). More than half of the students came from rural areas (57.3%). At university entry, 82.5% of students lived away from their parents or relatives. Most parents were employed (fathers: 99.0%, mothers: 91.1%), and over half had attained vocational or college-level education. Nearly all students (95.8%) had siblings, and 79.8% came from two-generation households. (**Table 1**)

RESULTS

Table 1. Socio-demographic characteristics and mental health status of the study participants (n = 405)

Characteristics of the study participants	n (%)	Mental health		p-value
		With signs of depressive symptoms n (%)	Without signs of depressive symptoms n (%)	
Sex				
Male	225 (55.6)	71 (31.6)	154 (68.4)	0.020
Female	180 (44.4)	77 (42.8)	103 (57.2)	
Ethnicity				
Kinh	387 (95.6)	139 (35.9)	248 (64.1)	0.225
Others	18 (4.4)	9 (50.0)	9 (50.0)	
Religion				
No	345 (85.2)	122 (35.4)	223 (64.6)	0.237
Yes	60 (14.8)	26 (43.3)	34 (56.7)	
Place of residence before entering university				
Urban area	173 (42.7)	59 (34.1)	114 (65.9)	0.379
Rural area	232 (57.3)	89 (38.4)	143 (61.6)	
Current place of residence				
Living with parents/relatives	71 (17.5)	21 (29.6)	50 (70.4)	0.180
Not living with parents/relatives	334 (82.5)	127 (38.0)	207 (62.0)	
Marital status of biological parents				
Stable	369 (91.1)	132 (35.8)	237 (64.2)	0.302
Unstable	36 (8.9)	16 (44.4)	20 (55.6)	
Occupation of biological father/stepfather/adoptive father				
Employed	401 (99.0)	147 (36.7)	254 (63.3)	0.630
Unemployed	4 (1.0)	1 (25.0)	3 (75.0)	

Characteristics of the study participants	n (%)	Mental health		p-value
		With signs of depressive symptoms n (%)	Without signs of depressive symptoms n (%)	
Occupation of biological mother/stepmother/adoptive mother				
Employed	369 (91.1)	133 (36.0)	236 (64.0)	0.504
Unemployed	36 (8.9)	15 (41.7)	21 (58.3)	
Educational level of biological father/stepfather/adoptive father				
Vocational/College or higher	211 (52.1)	71 (33.6)	140 (66.4)	0.207
High school or below	194 (47.9)	77 (39.7)	117 (60.3)	
Educational level of biological mother/stepmother/adoptive mother				
Vocational/College or higher	218 (53.8)	73 (33.5)	145 (66.5)	0.168
High school or below	187 (46.2)	75 (40.1)	112 (59.9)	
Siblings				
With siblings	388 (95.8)	142 (36.6)	246 (63.4)	0.913
Without siblings	17 (4.2)	6 (33.6)	11 (64.7)	
Number of generations living together before university				
Two generations (parents and children)	323 (79.8)	119 (36.8)	204 (63.2)	0.804
More than two generations	82 (20.2)	29 (35.4)	53 (64.6)	

Mental Health Status

The mean WHO-5 Well-Being Index score was 14.2 (SD = 5.7), ranging from 0 to 25. Based on the established cut-off score of <13 to indicate signs of depressive symptoms, 36.5% of participants (n = 148) screened positive for

depressive symptoms (**Table 2**). Among the individual WHO-5 items, the statement "I felt calm and relaxed" had the highest positive response rate, with 70.1% of students reporting feeling this way "more than half of the time" or more (**Table 3**).

Table 2. Assessment of the Mental Health Status of the Study Participants according to WHO-5 (n = 405)

Mental health status according to WHO-5	n (%)
Signs of depressive symptoms (WHO-5 < 13)	148 (36.5)
No signs of depressive symptoms (WHO-5 ≥ 13)	257 (63.5)
WHO-5 score (SD)	Mean (SD)
	14,2 (5.7)
	Min: 0.0
	Max: 25.0

Table 3. Frequency of well-being states based on WHO-5 (n = 405)

Item	Statement	At no time	Some of the time	Less than half	More than half	Most of the time	All the time
WB1	In the past two weeks, I have felt cheerful and in good spirits	7 (1.7)	68 (16.8)	54 (13.3)	125 (30.9)	111 (27.4)	40 (9.9)
WB2	I have felt calm and relaxed	10 (2.5)	53 (13.1)	58 (14.3)	141 (34.8)	100 (24.7)	43 (10.6)
WB3	I have felt active and vigorous	12 (3.0)	57 (14.1)	75 (18.5)	136 (33.6)	83 (20.5)	42 (10.4)
WB4	I woke up feeling fresh and rested	24 (5.9)	68 (16.8)	87 (21.5)	108 (26.7)	79 (19.5)	39 (9.6)
WB5	My daily life has been filled with things that interest me	17 (4.2)	64 (15.8)	88 (21.7)	123 (30.4)	76 (18.8)	37 (9.1)

Values are presented as number (%).

Factors associated with depressive symptoms

Bivariate analysis revealed a statistically significant difference in the prevalence of depressive symptoms by gender: 42.8% of female students reported signs of depressive symptoms compared to 31.6% of male students ($p = 0.020$). No significant associations were observed for ethnicity, religion, place of residence (before or during university), parental marital status, parental occupation,

education level, sibling presence, or household generations (**Table 1**).

In multivariable logistic regression, after adjustment for all collected socio-demographic covariates, gender remained the only factor significantly associated with depressive symptoms. Female students had 1.538 times higher odds of depressive symptoms compared to male students (AOR = 1.538; 95% CI: 1.010–2.342; $p = 0.045$) (**Table 4**).

Table 4. Factors related to depressive symptoms of the study participants

Characteristics of the study participants		With signs of depressive symptoms	
		AOR (95%CI)	p-value
Sex	Male	1	-
	Female	1.538 (1.010 - 2.342)	0.045
Ethnicity	Kinh	1	-
	Others	1.419 (0.526 - 3.823)	0.489
Religion	No	1	-
	Yes	1.163 (0.636 - 2.128)	0.624
Place of residence before entering university	Urban area	1	-
	Rural area	1.037 (0.645 - 1.666)	0.882

Characteristics of the study participants		With signs of depressive symptoms	
		AOR (95%CI)	p-value
Current place of residence	Living with parents/relatives	1	-
	Not living with parents/relatives	1.353 (0.749 - 2.445)	0.316
Marital status of biological parents	Stable	1	-
	Unstable	1.398 (0.678 - 2.882)	0.365
Occupation of biological father/stepfather/adoptive father	Employed	1	-
	Unemployed	0.623 (0.058 - 6.654)	0.695
Occupation of biological mother/stepmother/adoptive mother	Employed	1	-
	Unemployed	1.212 (0.579 - 2.536)	0.610
Highest educational level of biological father/stepfather/adoptive father	Vocational/College or higher	1	-
	High school or below	1.073 (0.585 - 1.969)	0.820
Highest educational level of biological mother/stepmother/adoptive mother	Vocational/College or higher	1	-
	High school or below	1.134 (0.607 - 2.119)	0.694
Siblings	With siblings	1	-
	Without siblings	0.996 (0.342 - 2.900)	0.994
Number of generations living together before university	Two generations (parents and children)	1	-
	More than two generations	0.965 (0.572 - 1.628)	0.895

DISCUSSION

This study found that 36.5% of first-year medical students at Hue University of Medicine and Pharmacy showed signs of depressive symptoms according to the WHO-5 Well-Being Index. This prevalence is lower than that reported by Huynh Ho Ngoc Quynh et al. (63.7%) and Tran Quynh Anh et al. (45.5%), yet it is broadly in line with international estimates from the WHO World Mental Health International College Student Project, which reported prevalence rates of approximately 35%.^{5, 14} Variability in prevalence across studies is likely influenced by methodological and contextual differences. In particular, the use of different screening instruments (such as the WHO-5 versus the DASS-21), the inclusion of students from multiple academic years, and differences in

academic and social stressors may contribute to divergent findings. For example, Tran Van Thien et al. (2024) reported a 70.9% prevalence of depression among first-year students in Hanoi using the DASS-21, while Cap Minh Duc et al. (2024) found a prevalence of 43.3% across four provinces during the COVID-19 period.^{7, 17} Taken together, these comparisons suggest that estimates of depressive symptoms among medical students are highly sensitive to both the measurement tools employed and the specific study context. Consequently, prevalence figures should be interpreted with caution, particularly when comparisons are made across different regions, time periods, and methodological approaches.

To gain a more nuanced understanding of mental well-being in our

sample, we examined students' responses to individual WHO-5 items in addition to the overall score. Among the five items, the statement "I felt calm and relaxed" received the highest proportion of frequent positive responses, with 70.1% of students indicating that this feeling occurred "more than half of the time" or more. The WHO-5 is composed entirely of positively worded items intended to capture subjective mental well-being.¹⁸ In this study, the term "positive response rate" refers specifically to responses in the upper range of the Likert scale—namely "more than half of the time," "most of the time," and "all of the time." Selecting these options indicates that the positive state described by the item was experienced regularly during the two weeks preceding the survey. It should be emphasized that the WHO-5 functions as a validated unidimensional measure of overall well-being.¹² Although the item with the highest response rate refers explicitly to feeling calm and relaxed, it does not represent a distinct measure of relaxation in isolation. Instead, this item contributes to the overall WHO-5 score, which reflects general psychological well-being. Consequently, the observed pattern suggests a relative strength in this aspect of well-being within the student cohort, rather than indicating relaxation as a separate or dominant emotional state.

Novelty and contribution

This study contributes new evidence to the literature on medical student mental health in Vietnam by addressing several gaps in previous research. Unlike most earlier studies that relied on the DASS-21 and included students from multiple academic years, our study applied the WHO-5 Well-Being Index specifically to first-year medical students in Central Vietnam. This focus allows for a clearer assessment of mental health challenges during the early transition into medical education. Moreover, by providing data from a region that has been

underrepresented in prior research, the study adds important regional context. The examination of gender differences further strengthens the contribution, as this aspect has received limited attention in existing Vietnamese studies.

Unlike most previous Vietnamese studies, which used the DASS-21 and mixed academic cohorts, this research specifically applied the WHO-5 to first-year students in Central Vietnam. By doing so, it highlights the mental health challenges during the transition into medical education and provides evidence from a region with limited prior data. The focus on gender differences further strengthens the novelty, as local studies have rarely examined this aspect in depth.

Gender differences

Female students were more likely to report depressive symptoms than their male counterparts (42.8% vs. 31.6%), corresponding to an approximately 1.5-fold increased likelihood. This pattern is consistent with previous Vietnamese and international studies that have reported a higher prevalence of depressive symptoms among female students. Earlier interpretations often emphasized biological sex differences or socially constructed gender roles. However, more recent research has proposed alternative explanatory frameworks that extend beyond gender alone. For example, García-Fernández et al. (2025) suggested that differences in emotion regulation strategies and cognitive flexibility when responding to life stressors may play a more prominent role in depressive symptoms than gender itself.⁹ Prior studies have indicated that women tend to use maladaptive emotion regulation strategies, particularly rumination, which is a key factor contributing to their greater susceptibility to depression compared to men.^{19, 20} In contrast, Wang et al. (2022) found men to exhibit greater cognitive flexibility, supporting more effective adaptation.²¹

However, it must be acknowledged that our study did not include specific measures to assess students' emotion regulation strategies or cognitive flexibility. Consequently, the interpretation of this relationship remains hypothetical and requires further empirical validation. Therefore, incorporating these explanatory models into future research is recommended to help clarify gender differences in emotional disorders. In the demanding context of medical training, these psychological processes may be critical determinants of mental health outcomes, suggesting that gender-sensitive interventions should prioritize skills in emotion regulation and adaptive coping.

Medical education and stress context

Medical training in Vietnam follows a six-year curriculum that is widely recognized as demanding, with sustained academic pressure, high workload, and frequent disruption of sleep. In our study, indicators related to sleep quality and diminished interest in daily activities (WHO-5 items WB4 and WB5) emerged as the most compromised dimensions of student well-being. This pattern is in line with international evidence suggesting that academic stressors play a central role in undermining mental health among medical students. Supporting this interpretation, a recent study from Hungary (2024) demonstrated that WHO-5 scores among health science students were highly responsive to examination-related stress. In addition, longitudinal research from South Korea and North America has consistently reported higher rates of depression among medical students compared with their non-medical peers.^{6, 22, 23} Taken together, these findings suggest that features inherent to the academic environment may exert a stronger influence on student mental health than background socio-demographic characteristics alone.

Regional and contextual comparisons

In this study, the prevalence of depressive symptoms (36.5%) was lower than that reported in studies from Northern Vietnam, where rates exceeding 70% have been documented, yet remained comparable to multicenter findings from Southern Vietnam (43.3%).^{7, 24} These differences point toward potential regional variation in student mental health across the country. Central Vietnam may present a distinct context, characterized by smaller urban environments, closer family ties, and variation in the availability and organization of university-based mental health services. When viewed in a broader international context, prevalence estimates from Western student populations assessed using the WHO-5 commonly range from 20% to 30%, suggesting a relatively greater mental health burden among Vietnamese medical students, particularly those studying in Hue.^{25, 26} Differences in cultural norms, limited access to counseling resources, and challenges associated with the transition into medical education may collectively contribute to these observed patterns.

Practical implications

The findings of this study point to several implications for medical education practice in Vietnam. Routine use of brief screening tools such as the WHO-5 within student health services could support earlier identification of mental health concerns, given its established validity and ease of administration.¹³ In addition, mental health interventions should take gender-related differences into account, particularly by strengthening emotion regulation and adaptive coping skills among female students, as suggested by previous research.^{19, 20} At the institutional level, incorporating structured training on stress management and cognitive flexibility into the medical curriculum may help mitigate

symptoms of depression and anxiety, as these competencies have been shown to enhance psychological resilience.^{27, 28} Supportive measures during the first academic year—including expanded counseling services, peer-support initiatives, and mentorship opportunities—may further assist students in navigating the transition into medical training. Beyond individual institutions, greater attention from national and local policymakers is needed to strengthen mental health support systems for medical students, especially in Central Vietnam, where available resources remain more limited than in larger urban centers such as Hanoi or Ho Chi Minh City.

Strengths and limitations

One notable strength of this study lies in its focus on first-year medical students and the use of the validated WHO-5 Well-Being Index, which provides novel evidence from a region that has been underrepresented in previous research. Nevertheless, interpretation of the results requires caution due to certain limitations.

Data were collected from a single institution using a convenience sampling approach, which may reduce the sample's representativeness and restrict the external validity of the findings to other settings. In addition, self-selection bias remains a potential concern, as the characteristics of volunteers might diverge from those of non-participants. The cross-sectional nature of the study also restricts any inference about causal relationships between depressive symptoms and associated factors. Furthermore, because the study design primarily emphasized socio-demographic characteristics, important psychosocial variables—such as academic stress, sleep quality, and financial strain—were not measured. The absence of these factors may have constrained the ability of the regression model to fully reflect the complexity of influences on depressive symptoms.

Future research would benefit from longitudinal and multi-center designs that incorporate a broader range of psychosocial measures. Such approaches could help clarify mental health trajectories among medical students and support the evaluation of targeted interventions across diverse educational and regional contexts in Vietnam.

CONCLUSION

This study is the first to apply the WHO-5 Well-Being Index to first-year medical students in Central Vietnam. More than one-third of participants showed signs of depressive symptoms, with female students at significantly higher risk. These findings highlight the transitional vulnerability of first-year students and confirm the utility of the WHO-5 as a rapid screening tool in academic settings.

The results suggest the urgent need for early, gender-sensitive interventions within medical schools. Routine WHO-5 screening, improved counseling services, and targeted training in emotion regulation and stress management should be integrated into student health support. Attention should also be given to structural factors in medical education, such as workload and examination pressure, which strongly influence student well-being. Developing intensive skill-based courses focusing on adaptive emotion regulation strategies and cognitive flexibility will enable students to cope more effectively with specific situations. At the same time, implementing mental health screening programs for early detection and timely intervention, combined with counseling services and support to help students manage stress and adapt to the academic environment, is critically important during the first year at university.

Future studies should adopt longitudinal and multicenter designs to track mental health trajectories across medical training years and to evaluate the

effectiveness of tailored interventions in diverse Vietnamese contexts.

AUTHORS' CONTRIBUTIONS

BTN: Conceptualization, Writing - original draft, Data Curation, Investigation, Methodology, Resources, and Project administration. BTT: Data Curation, Investigation, Formal analysis, Software, Visualization, and Writing - review & editing. CKD: Data Curation, Investigation, Formal analysis, and Software. TTMT: Data Curation, Investigation, and Writing - review & editing. NHDV: Conceptualization, Writing - review & editing, Data Curation, Investigation, Methodology, Supervision, Validation, and Project administration.

ETHICAL CONSIDERATION

This study was approved by the Ethics Committee in Biomedical Research, University of Medicine and Pharmacy, Hue University under the reference number H2024/579. This ethics approval was received on October 11th, 2024.

ACKNOWLEDGMENT

We thank the University of Medicine and Pharmacy, Hue University for its research funding, and we sincerely thank all study subjects for their participation.

FUNDING

This research project was financially supported by the University of Medicine and Pharmacy, Hue University.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest relevant to this study.

REFERENCES

1. World Health Organization. Promoting mental health: concepts, emerging evidence, practice [Internet]. Geneva: World Health Organization; 2005 [Cited 2025 July 20]. Available from: <https://iris.who.int/bitstream/handle/10665/42940/9241591595.pdf>
2. Wyatt TJ, Oswalt SB, Ochoa Y. Mental health and academic performance of first-year college students. *Int J High Educ.* 2017;6(3):178–87. doi: 10.5430/ijhe.v6n3p178.
3. Duffy A, Keown-Stoneman C, Goodday S, Horrocks J, Lowe M, King N, et al. Predictors of mental health and academic outcomes in first-year university students: identifying prevention and early-intervention targets. *BJPsych Open.* 2020;6(3):e46. doi: 10.1192/bjo.2020.24.
4. Auerbach RP, Mortier P, Bruffaerts R, Alonso J, Benjet C, Cuijpers P, et al. WHO World Mental Health Surveys International College Student Project: prevalence and distribution of mental disorders. *J Abnorm Psychol.* 2018; 127(7):623-38. doi: 10.1037/abn0000362.
5. Tran QA, Dunne MP, Luu NH. Well-being, depression and suicidal ideation among medical students throughout Vietnam. *Vietnam J Med Pharm.* 2014;6:23-30.
6. Roh MS, Jeon HJ, Kim H, Han SK, Hahm BJ. The prevalence and impact of depression among medical students: a nationwide cross-sectional study in South Korea. *Acad Med.* 2010;85(8): 1384-90. doi: 10.1097/ACM.0b013e3181df5e43.

7. Cap DM, Nguyen AQ, Nguyen TT. Mental health of medical students after combating the COVID-19 epidemic: a cross-sectional study in Vietnam. *J Prev Med Public Health*. 2024;57(4):347-55. doi: 10.3961/jpmph.24.108.
8. Nguyen VP, Nguyen QT, Pham VV, Vo TH, Le TCT, Le KT, et al. Factors associated with depression, anxiety, and stress among medical college students. *J Med Res*. 2024;184(11E15):96-105. doi: 10.52852/tcncyh.v184i11E15.2704.
9. García-Fernández M, Fuentes-Sánchez N, Escrig MA, Eerola T, Pastor MC. Gender, emotion regulation, and cognitive flexibility as predictors of depression, anxiety, and affect in healthy adults. *Curr Psychol*. 2025;44:5685-94. doi: 10.1007/s12144-024-07240-6.
10. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. *Med Educ*. 2005;39(6):594-604. doi: 10.1111/j.1365-2929.2005.02176.x.
11. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among US and Canadian medical students. *Acad Med*. 2006;81(4):354-73. doi: 10.1097/00001888-200604000-00009.
12. Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 well-being index: a systematic review of the literature. *Psychother Psychosom*. 2015;84(3):167-76. doi: 10.1159/000376585.
13. Sischka PE, Costa AP, Steffgen G, Schmidt AF. The WHO-5 well-being index: validation based on item response theory and analysis of measurement invariance across 35 countries. *J Affect Disord Rep*. 2020;1(1):100020. doi: 10.1016/j.jadr.2020.100020.
14. Huynh HNQ, Tanasugarn C, Kengganpanich M, Lapvongwatana P, Khuong QL, Thanh TT. Mental well-being and coping strategies during stress for preclinical medical students in Vietnam. *J Popul Soc Stud*. 2019;28(2):116-29. doi: 10.25133/JPSSv28n2.008.
15. World Health Organization. Wellbeing measures in primary health care/the DepCare Project: report on a WHO meeting: Stockholm, Sweden, 12-13 February 1998 [Internet]. Regional Office for Europe; 1998 [Cited 2025 July 20]. Available from: <https://iris.who.int/handle/10665/349766>.
16. Tran QMA, Pham VM, Truong T, Hoang LNG, Nguyen SGA. Self-compassion and students' well-being among Vietnamese students: chain mediation effect of narcissism and anxiety. *J Ration Emot Cogn Behav Ther*. 2021;40(3):618-33. doi: 10.1007/s10942-021-00431-1.
17. Tran VT, Nguyen TML, Nguyen TBT, Dang BN, Nguyen TT, Mac DT. The status of stress, anxiety and depression among medical students at University of Medicine and Pharmacy-Vietnam National University studied at Hoa Lac in 2022-2023. *Vietnam J Community Med*. 2024;65(5):193-200.
18. Domenech A, Kasujee I, Koscielny V, Griffiths CEM. Systematic Review of the Use of the WHO-5 Well-Being Index Across Different Disease Areas. *Adv Ther*. 2025;42(8):3657-77. doi: 10.1007/s12325-025-03266-9.
19. Duarte AC, Matos AP, Marques C. Cognitive Emotion Regulation Strategies and Depressive Symptoms: Gender's Moderating Effect. *Procedia Soc Behav Sci*. 2015;165:275-83. doi: 10.1016/j.sbspro.2014.12.632.
20. Garnefski N, Teerds J, Kraaij V, Legerstee J, van den Kommer T. Cognitive emotion regulation strategies and Depressive symptoms: differences between males and females. *Pers Individ Dif*. 2004;36(2):267-76. doi: 10.1016/S0191-8869(03)00083-7.

21. Wang C, Zhang Z, Wiley JA, Fu T, Yan J. Gender differences in pleasure: the mediating roles of cognitive flexibility and emotional expressivity. *BMC Psychiatry*. 2022;22:320. doi: 10.1186/s12888-022-03945-9.
22. Szepe O, Meszaros A. Assessing well-being of university students and evaluation of its determinants. *BMC Public Health*. 2024;24(1):2862. doi: 10.1186/s12889-024-20287-1.
23. 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. doi: 10.1001/jama.2016.17324.
24. Pham TV, Le NQ. Prevalence of stress, anxiety, depression and associated factors in medical students: a review and analysis. *Biomed J Sci Tech Res*. 2024;56(4):008900. doi: 10.26717/BJSTR.2024.56.008900.
25. Ochnik D, Rogowska AM, Kuśnierz C, Jakubiak M, Schütz A, Held MJ, et al. Mental health prevalence and predictors among university students in nine countries during the COVID-19 pandemic: a cross-national study. *Sci Rep*. 2021;11:18516. doi: 10.1038/s41598-021-97697-3.
26. Adams KL, Eisenberg D, Finkelstein EA. Mental health trajectories in undergraduate students over time: a longitudinal study. *BMJ Open*. 2021;11(12):e047393. doi: 10.1136/bmjopen-2020-047393.
27. Park KH, Kim DH, Kim SK, Yi YH, Jeong JH, Chae J, et al. The relationships between empathy, stress and social support among medical students. *Int J Med Educ*. 2020;11:183-9. doi: 10.5116/ijme.55e6.0d44.
28. Arabatzis TJ, Marsidi J, Ashraf M, Supino C, Smith R. Gender disparities in symptoms of depression after medical school exams and student coping strategies for postexam depression symptoms. *J Med Educ Curric Dev*. 2022;9:23821205211055391. doi: 10.1177/23821205211055391.