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Stressors and Coping Strategies among Vietnamese Medical Students: A Study in a Southern Medical University

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ABSTRACT

Stress among medical students adversely affects academic performance and mental health. Understanding the main stressors, coping strategies, and stress-associated factors is essential for developing effective interventions. A cross-sectional study was conducted with 1,387 full-time medical students at Can Tho University of Medicine and Pharmacy, Vietnam to investigate the stressors, coping strategies, and factors associated with stress among medical students. Stressors were assessed using the Medical Student Stressor Questionnaire, and coping strategies were evaluated with the Brief COPE. Independent *t*-tests, Pearson correlation, and multivariate linear regression were employed for data analysis. The results showed that 85.2% of students experienced moderate to severe stress, predominantly due to academic-related stressors (ARS: 2.44±0.82), followed by group activity-related stressors (GARS: 1.96±0.92). Clinical students reported significantly higher stress level in ARS (p = 0.020) and GARS (p = 0.029), while preclinical students experienced higher social-related stress (SRS: p = 0.001). Emotion-focused strategies, particularly positive reframing (6.20±1.72) and acceptance (6.33±1.74), were most commonly used. Passive or avoidant strategies, such as self-blame and behavioural disengagement, were strongly associated with higher stress scores (β = 0.238, p < 0.001). Additionally, problem-focused strategies (β = 0.087, p < 0.001) and female gender (β = 0.145, p < 0.001) were independently linked to higher stress. Stress among medical students is strongly influenced by academic and group activity-related stressors, maladaptive coping strategies, and female gender. Interventions should focus on addressing these factors while promoting adaptive coping mechanisms to help alleviate stress levels.

Keywords: *Stressors, Coping strategies, Mental health, Medical students, Associated factors*

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INTRODUCTION

When demands exceed one's perceived ability to cope, stress—a natural human physiological and psychological reaction—becomes a ubiquitous experience affecting people worldwide (1). While it is a natural reaction designed to help individuals confront challenges and threats, its persistence and intensity can have detrimental effects on health and well-being. Modern environments, including workplaces and educational institutions, are widely recognised contributors to stress. Research conducted over decades has identified various stressors, ranging from major life events to specific challenges encountered in academic settings. Medical students often experience heightened stress due to the rigorous demands of their education (1–4).

Medical students encounter stress stemming from various factors, such as rigorous academic demands, challenges in interpersonal relationships, personal expectations, family obligations, work–life balance and financial pressures (2, 5–7). Studies report that these pressures can lead to mental health issues, such as anxiety, stress and depression (2, 8), and are associated with an increased risk of disease (9). Stress is alarmingly prevalent among medical students worldwide. For instance, surveys indicate stress rates of 34.3% in Saudi Arabia, 26.5% in the USA, and 38% in Australia (10–12). In Vietnam's collectivist culture, students often bear significant family expectations to excel academically and professionally, which can amplify stress levels, particularly in demanding fields, such as medicine (5, 13). Medical universities in Vietnam have reported a significant proportion of students experiencing moderate levels of stress (7–11). A study revealed prevalence rates of depression, anxiety and stress of 51.6%, 70.3% and 49.9%, respectively (14). Remarkably, depression is significantly more common among Vietnamese medical students compared to the general population (6).

Understanding how individuals cope with stress is crucial to mitigating its negative effects. Coping is defined as the "constantly changing cognitive and behavioural efforts to manage specific external and internal demands that are appraised as taxing or exceeding the person's resources" (15). Lazarus and Folkman conceptualised coping as a mediating factor between stressors, resources, and the stress response, emphasising its intrinsic link to cognitive appraisal (15). Coping strategies are broadly classified into problem-focused and emotion-focused approaches (16). Problem-focused coping aims to address the source of stress directly, whereas emotion-focused coping seeks to manage emotional responses, especially in situations perceived as unchangeable (15).

Several studies have explored the coping mechanisms of medical students. For instance, Kim et al. found that resilience, effective family functioning, and spiritual support played significant roles in reducing stress during the COVID-19 pandemic (17). Abouammoh et al. emphasised the rewarding aspects of the medical profession as an adaptive coping strategy, while avoidant strategies, such as avoiding discussions about academic topics or engaging in unhealthy behaviours, were found to be less effective (18). In Thailand, medical students predominantly applied adaptive strategies, such as employing self-distraction, practicing acceptance, active coping, and positive reframing, while maladaptive strategies, such as denial and substance use, were associated with higher stress levels (19).

The education system in Vietnam, with its intense focus on examination results and heavy workloads, is a primary source of stress for medical students. Studies have highlighted that academic performance and workload complexity are significant stressors in Vietnam, with coping mechanisms differing from those observed in Western or other Asian countries (6, 20, 21). In Vietnam, Nguyen et al. identified academic performance, examinations, and

workload complexity as primary contributors to stress. Students adopting adaptive coping mechanisms, such as problem-solving, positive thinking, and emotion regulation, tended to report lower stress levels and better academic outcomes. In contrast, maladaptive strategies, such as avoidance and wishful thinking, were found to be linked to higher stress and poorer academic performance (22). A study by Pham et al. at Hanoi Medical University found that students primarily employed problem-focused coping strategies, followed by seeking social support, while avoidance strategies were the least utilised (23).

While numerous studies have explored stress and coping mechanisms, there remains a limited body of research specifically analysing stressors among Vietnamese medical students, particularly those enrolled in full-time medical programmes, as well as interventions tailored to Vietnam's cultural and educational contexts (5, 14, 24, 25). Identifying sources of stress and effective coping mechanisms is essential to improving mental health and academic performance. Moreover, by studying resilience and well-being among future healthcare professionals, we can gain practical knowledge of stress management strategies in diverse educational and cultural contexts, offering valuable insights for countries with similar healthcare education systems or cultural settings.

This study aims to investigate the stressors experienced by medical students using the Medical Student Stressor Questionnaire (MSSQ) and to examine their coping strategies. Additionally, we seek to identify factors associated with stress, with the goal of informing policies and interventions to support medical students in managing stress and enhancing their overall well-being.

METHODS

Study Design and Subjects

This cross-sectional study was conducted using an anonymous internet-based survey administered from May to June 2022. All full-time medical students enrolled at Can Tho University of Medicine and Pharmacy, Vietnam, during the 2021/2022 academic year were invited to participate via their institutional email. Participation was voluntary, and all respondents who completed the survey were eligible for inclusion. Students with incomplete responses or those who had temporarily paused their studies during the study period were excluded.

The required sample size was calculated using a formula for estimating a quantitative variable and the associated standard deviation (SD) (26). According to a study by Paudel et al., academic-related stressors caused the highest stress levels among medical students, with an SD of 0.57 (27). With a margin of error set at 3% and a significance level of $\alpha = 5\%$, the calculated sample size was 1,378. The sampling procedure was conducted by a third party who was not involved in the study and had expertise in using computer-based randomisation methods. After the survey period ended, all responses were anonymised using computer-generated labels. To ensure proportional representation across academic years (first to sixth year), the required sample size for each year was calculated based on the proportion of the total respondents. Stratified random sampling was then employed, with participants randomly selected within each academic year until the required sample size was achieved.

Data Collection and Study Instruments

The general characteristics of the participants, including age, gender, academic year, grade point average, and current living arrangements (with family, friends, or alone), were collected through a survey form. The survey also included items from the MSSQ and Brief Coping Orientation to Problems Experienced (COPE) scales and was administered via Microsoft Forms during the study period. Personally identifiable information was not collected to ensure anonymity. All full-time medical students enrolled during the defined study period were invited to participate voluntarily. Only complete responses were deemed eligible for inclusion in the study. To minimise the dropout rate, several strategies were implemented. The survey was designed to be concise and engaging, with a clearly provided timeframe for participation. The purpose of the study, the intended use of the data, and the potential impact of the participants' contributions were transparently explained to build trust and encourage involvement. The survey platform was optimised for use on multiple devices, including mobile phones, to ensure accessibility. The participants were assured of their anonymity and the confidentiality of their responses to further build trust. Additionally, technical support was made available to assist respondents with any issues that arose during their participation.

The MSSQ is a widely recognised instrument developed and validated by Yusoff et al., Yusoff, and Yusoff and Fuad (28–30) to identify stressors among medical students. This tool comprises 40 items designed to investigate stressors across six domains: academic-related stressors (ARS), interpersonal- and intrapersonal-related stressors (IRS), teaching and learning-related stressors (TLRS), social-related stressors (SRS), drive- and desire-related stressors (DRS), and group activities–related stressors (GARS). Yusoff conducted a confirmatory factor analysis of the full 40-item questionnaire to determine the most valid and reliable structure. The analysis identified that a six-domain model with 20 items provided the best fit for assessing stressors among medical students (31). Each item in the MSSQ is rated on a 5-point scale from 0 to 4, where 0 indicates no stress, 1 indicates mild stress, 2 indicates moderate stress, 3 indicates high stress, and 4 indicates severe stress. The average score for each domain and the overall score is calculated, with results classified as follows: 0–1.00 signifies mild stress, 1.01–2.00 signifies moderate stress, 2.01–3.00 signifies high stress, and 3.01–4.00 signifies severe stress. In the current study, the 20-item MSSQ was employed to identify stressors and assess stress levels among medical students at our institution. The Cronbach's alpha for the MSSQ in this study was 0.937 (95% CI: 0.932–0.941), indicating excellent internal consistency.

The Brief COPE is an abbreviated, modified version of the COPE Inventory developed by Carver (32). This 28-item scale measures how frequently an individual attempts to deal with problems, encompassing a range of distinct coping strategies in response to stress. These strategies are grouped into three categories: (a) problem-focused strategies (PFS) (active coping, planning, and using instrumental support); (b) emotion-focused strategies (EFS) (positive reframing, practicing acceptance, using humour, practicing religion, and accessing emotional support); and (c) passive and/or avoidant strategies (PAS) (venting, self-blaming, employing self-distraction, denying reality, using substances, and resorting to behavioural disengagement). Each item is rated on a 4-point Likert scale, where 1 indicates "I haven't been doing this at all", 2 indicates "I've been doing this a little bit", 3 indicates "I've been doing this a medium amount", and 4 indicates "I've been doing this a lot". Each factor score is computed by summing the ratings of its two items, yielding a total score ranging from 2 to 8. The mean score is calculated as the average of its two items. The current study utilised the validated Vietnamese version of the Brief COPE (33), which demonstrated excellent internal consistency, with a Cronbach's $\alpha = 0.903$ (95% CI: 0.895–0.910) in this study.

Statistical Analysis

All analyses in the present study were performed using the Statistical Package for the Social Sciences (SPSS) version 27.0. Each qualitative variable was expressed as a frequency (n) and percentage (%), while each quantitative variable was presented as the mean and standard deviation (SD). The mean scores for each stressor domain and coping strategy were compared between academic phases (preclinical vs clinical) using independent samples *t*-tests. Pearson correlation analysis was conducted to explore the relationships between coping strategies, stressor domains and demographic variables. Both univariate and multivariate linear regression analyses were performed to identify factors associated with the mean stress scores among medical students. A p-value < 0.05 was considered statistically significant.

RESULTS

Characteristics of Participants

During the study period, a total of 1,763 complete responses were recorded, resulting in a response rate of 30.0%. This study surveyed 1,387 medical students, representing 23.6% of the university's medical student population during the study period. The participants had a mean age of 21.9 years (SD = 1.9), with females making up 55.4% (n = 768) of the sample. More than half of the respondents (59%, n = 819) were in the clinical phase, and 85.9% (n = 1,192) had a GPA of 2.5 or higher. Stress was a prevalent concern, with moderate and high stress levels reported by 44.1% (n = 612) and 34.2% (n = 474) of students, respectively, reflecting the significant psychological demands of medical education—particularly in the clinical phase, in which responsibilities such as patient care can intensify stress. A slight majority of students (53.0%, n = 735) lived alone, which may exacerbate stress due to reduced access to immediate social support. These findings highlight the challenges faced by medical students, particularly high levels of stress and the potential impact of living arrangements on mental health (as described in Table 1).

Table 1: Characteristics of study participants

Characteristics	n (%)
Age (years)	21.9 (1.9)†
Gender	
Male	619 (44.6)
Female	768 (55.4)
Academic phase	
Preclinical (first to third year)	568 (41.0)
Clinical (fourth to sixth year)	819 (59.0)
Grade point average	
≥ 2.5	1,192 (85.9)
< 2.5	195 (14.1)

(*Continued on next page*)

Table 1: (*Continued*)

Characteristics	n (%)
Living with	
Family or friends	652 (47.0)
Alone	735 (53.0)
Stress severity	
Mild	205 (14.8)
Moderate	612 (44.1)
High	474 (34.2)
Severe	96 (6.9)

Note: †Data was presented as mean (SD); Grade point average was recorded on a 0.0–4.0 scale system.

Stressors and Coping Strategies

Stress scores across various domains of the MSSQ reveal notable differences between preclinical and clinical students, with higher levels of stress reported in most domains by clinical-phase students. This reflects the practical demands, clinical responsibilities, and career preparation specific to this group. Clinical students exhibited significantly higher scores for ARS (mean = 2.48 vs. 2.38, $p = 0.020$), TLRS (mean = 1.63 vs. 1.45, $p = 0.001$), DRS (mean = 1.36 vs. 1.06, $p < 0.001$), and GARS (mean = 2.00 vs. 1.90, $p = 0.029$). These findings highlight the heightened stress clinical students face due to their academic workload, professional pressures, and collaborative activities. Conversely, preclinical students reported significantly higher scores for SRS (mean = 1.82 vs 1.65, $p = 0.001$), likely reflecting their early-stage challenges in adapting to medical training. No significant differences were observed for IRS (mean = 1.76 in clinical vs 1.69 in preclinical students, $p = 0.244$). These findings underscore how stress profiles differ across academic phases, emphasising the need for tailored interventions to address the distinct stressors faced by preclinical and clinical students.

Table 2: The stressor score and the Brief COPE score among medical students

Stressors and coping strategies	Total (n = 1,387)	Preclinical (n = 568)	Clinical (n = 819)	*p*-value
Stressor domain				
ARS	2.44 (0.82)	2.38 (0.80)	2.48 (0.82)	0.020
IRS	1.73 (1.06)	1.69 (1.05)	1.76 (1.08)	0.244
TLRS	1.56 (0.96)	1.45 (0.92)	1.63 (0.98)	0.001
SRS	1.72 (0.96)	1.82 (0.99)	1.65 (0.94)	0.001
DRS	1.24 (1.14)	1.06 (1.09)	1.36 (1.17)	< 0.001
GARS	1.96 (0.92)	1.90 (0.91)	2.00 (0.93)	0.029
Problem-focused strategies				
Active coping	6.07 (1.72)	5.94 (1.73)	6.15 (1.71)	0.027
Planning	6.03 (1.76)	5.92 (1.75)	6.10 (1.76)	0.064

(*Continued on next page*)

Table 2: (*Continued*)

Stressors and coping strategies	Total (n = 1,387)	Preclinical (n = 568)	Clinical (n = 819)	*p*-value
Using instrumental support	4.49 (1.92)	4.51 (1.97)	4.47 (1.90)	0.752
Emotion-focused strategies				
Positive reframing	6.20 (1.72)	6.11 (1.73)	6.26 (1.72)	0.126
Acceptance	6.33 (1.74)	6.34 (1.76)	6.32 (1.74)	0.841
Humour	4.17 (1.91)	4.13 (1.89)	4.20 (1.93)	0.525
Religion	4.71 (2.11)	4.71 (2.15)	4.71 (2.10)	0.980
Using emotional support	5.29 (1.88)	5.37 (1.89)	5.23 (1.86)	0.150
Passive and/or avoidant strategies				
Venting	5.45 (1.88)	5.51 (1.92)	5.41 (1.85)	0.329
Self-blame	5.23 (2.00)	5.32 (2.00)	5.18 (2.00)	0.202
Self-distraction	5.97 (1.88)	6.00 (1.89)	5.94 (1.87)	0.560
Denial	3.91 (1.85)	3.92 (1.86)	3.91 (1.84)	0.973
Substance use	3.35 (1.82)	3.17 (1.73)	3.48 (1.87)	0.001
Behavioural disengagement	3.91 (1.91)	3.83 (1.90)	3.96 (1.92)	0.225

Notes: Data are presented as mean (SD); ARS = Academic Related Stressors; IRS = Intrapersonal and Interpersonal Related Stressors; TLRS = Teaching and Learning Related Stressors; SRS = Social Related Stressors; DRS = Drive and Desire Related Stressors; GARS = Group Activity Related Stressors.

Medical students demonstrated distinct patterns in their use of coping strategies, with some variations observed between the preclinical and clinical phases. Among PFS, active coping was significantly more prevalent in clinical students (mean = 6.15) compared to preclinical students (mean = 5.94, $p = 0.027$), suggesting that clinical-phase students are more likely to actively address stressors. Although clinical students also reported slightly higher scores for planning (mean = 6.10 vs 5.92), the difference did not reach statistical significance ($p = 0.064$), and no significant difference was observed in the use of instrumental support ($p = 0.752$). Concerning EFS, positive reframing was slightly more frequent among clinical students (mean = 6.26) compared to preclinical students (mean = 6.11), although this difference was not statistically significant ($p = 0.126$). Religion showed no difference between the groups, with both reporting a mean score of 4.71 ($p = 0.980$). In contrast, acceptance was slightly higher among preclinical students (mean = 6.34) compared to clinical students (mean = 6.32), but this difference was not significant ($p = 0.841$). Similarly, using emotional support was slightly lower in clinical students (mean = 5.23) compared to preclinical students (mean = 5.37), although the difference was not statistically significant ($p = 0.150$).

Regarding PAS, venting, self-distraction, denial, and behavioural disengagement showed no significant differences between preclinical and clinical students ($p > 0.05$). Self-blame was modestly more prevalent among preclinical students (mean = 5.32) compared to clinical students (mean = 5.18), although this difference was not significant ($p = 0.202$). In contrast, substance use was significantly higher among clinical students (mean = 3.48) than among preclinical students (mean = 3.17, $p = 0.001$), indicating that clinical-phase students may rely more on this maladaptive coping mechanism.

Table 3 presents the correlations between the demographic variables, MSSQ stress domains, and Brief COPE subscales for PFS, EFS and PAS. PFS such as active coping, planning and using instrumental support, were positively correlated with stress domains, particularly ARS and IRS, with planning showing the strongest correlation ($r = 0.196$, $p < 0.01$). EFS such as positive reframing and acceptance, demonstrated weaker but significant correlations with ARS and IRS (e.g. acceptance: $r = 0.128$, $p < 0.01$), suggesting moderate use of these strategies. Passive/avoidant strategies, including self-blaming, resorting to behavioural disengagement, and venting, were strongly associated with stress domains, particularly ARS (self-blame: $r = 0.326$, $p < 0.01$) and DRS (behavioural disengagement: $r = 0.224$, $p < 0.01$), highlighting their correlation with elevated stress levels. Gender differences were evident, with females being more likely to use PFS (e.g. active coping: $r = 0.077$, $p < 0.01$) and EFS (e.g. acceptance: $r = 0.107$, $p < 0.01$; emotional support: $r = 0.084$, $p < 0.01$), while males being more likely to resort to substance use ($r = -0.180$, $p < 0.01$). These findings suggest that while active and planning-focused strategies are common among students, interventions are needed to reduce reliance on maladaptive strategies, such as self-blame and behavioural disengagement, which are strongly linked to elevated stress levels.

Table 3: Correlation between demographics, MSSQ domains and Brief COPE subscale scores

Coping strategy	Gender	Year	ARS	IRS	TLRS	SRS	DRS	GARS
PFS								
Active coping	0.077**	0.054*	0.164**	0.130**	0.145**	0.070**	0.039	0.131**
Planning	0.062*	0.045	0.196**	0.180**	0.180**	0.125**	0.066*	0.180**
Using instrumental support	−0.006	0.026	0.128**	0.176**	0.165**	0.162**	0.137**	0.118**
EFS								
Positive reframing	0.052	0.028	0.137**	0.099**	0.103**	0.047	0.002	0.079**
Acceptance	0.107**	0.006	0.128**	0.101**	0.090**	0.091**	0.037	0.104**
Humour	−0.066*	0.031	0.094**	0.122**	0.138**	0.109**	0.102**	0.110**
Religion	0.021	0.005	0.103**	0.120**	0.136**	0.129**	0.096**	0.123**
Using emotional support	0.084**	−0.040	0.148**	0.178**	0.142**	0.154**	0.064*	0.148**
PAS								
Venting	0.041	−0.040	0.151**	0.146**	0.163**	0.125**	0.090**	0.168**
Self-blame	0.071**	−0.034	0.326**	0.411**	0.411**	0.340**	0.311**	0.438**
Self-distraction	0.104**	−0.041	0.149**	0.131**	0.131**	0.116**	0.116**	0.150**
Denial	−0.075**	−0.002	0.034	0.067*	0.072**	0.114**	0.077**	0.067*
Substance use	−0.180**	0.104**	0.104**	0.112**	0.169**	0.110**	0.162**	0.133**
Behavioural disengagement	−0.023	0.036	0.144**	0.172**	0.212**	0.182**	0.224**	0.218**

Notes: Data are presented using Pearson correlation, with ** p-values < 0.01 (2-tailed) and * p-value < 0.05 (2-tailed); Gender (0 = Male, 1 = Female); Year = Academic year (from 1 to 6); MSSQ = Medical Student Stressor Questionnaire; ARS = Academic Related Stressors; IRS = Intrapersonal and Interpersonal Related Stressors; TLRS = Teaching and Learning Related Stressors; SRS = Social Related Stressors; DRS = Drive and Desire Related Stressors; GARS = Group Activity Related Stressors; PFS = Problem-focused strategies; EFS = Emotion-focused strategies; PAS = Passive and/or avoidant strategies.

Factors Associated with Stress in Medical Students

Factors associated with mean stress scores among medical students are presented in Table 4, highlighting significant predictors identified through univariate and multivariate linear regression analyses. In the multivariate model, female gender (β = 0.145, 95% CI: 0.071–0.220, $p < 0.001$) and the use of PAS (β = 0.238, 95% CI: 0.200–0.276, $p < 0.001$) emerged as significant independent predictors of higher stress levels. PFS (β = 0.087, 95% CI: 0.051–0.122, $p < 0.001$) were also positively associated with stress scores, suggesting that despite their intention to address stressors, their use may reflect ongoing stress. Emotion-focused strategies, while showing a weak negative association (β = –0.035, 95% CI: –0.077 to 0.006, $p = 0.097$), did not reach statistical significance, indicating potential protective effects that require further investigation. Although the clinical phase was positively associated with stress scores in the univariate model ($p = 0.036$), this association did not remain significant in the multivariate analysis (β = 0.069, 95% CI: –0.006 to 0.145, $p = 0.073$). Other variables, including age ($p = 0.051$), GPA below 2.5 ($p = 0.089$), and living alone ($p = 0.479$), were not significant, even in the univariate model. These findings emphasise the importance of addressing gender-specific stressors and maladaptive coping mechanisms, particularly PAS, while enhancing effective stress management approaches tailored to medical students' needs.

Table 4: Factors associated with mean stress score in medical students

Variables	Univariate			Multivariate		
	β	95% CI	*p*-value	*β*	95% CI	*p*-value
Age (years)	0.022	0.000–0.044	0.051			
Female gender	0.148	0.067–0.229	< 0.001	0.145	0.071–0.220	< 0.001
GPA < 2.5	0.101	(–0.015)–0.217	0.089			
Clinical phase	0.088	0.006–0.170	0.036	0.069	(–0.006)–0.145	0.073
Living alone	0.029	(–0.052)–0.110	0.479			
Problem-focused strategies	0.140	0.110–0.169	< 0.001	0.087	0.051–0.122	< 0.001
Emotion-focused strategies	0.134	0.102–0.166	< 0.001	–0.035	(–0.077)–0.006	0.097
Passive and/or avoidant strategies	0.254	0.220–0.287	< 0.001	0.238	0.200–0.276	< 0.001

Note: CI = confidence interval; GPA = grade point average.

DISCUSSION

Prevalence of Stress

University students are essential to shaping a nation's future (34). However, stress has become a prominent health issue among undergraduate students, particularly those pursuing degrees in healthcare-related disciplines (3). Of the 1,387 students surveyed, 44.1% (n = 612) experienced moderate stress, 34.2% (n = 474) experienced high stress, and 14.8% (n = 205) and 6.9% (n = 96) experienced mild and severe stress, respectively (Table 1). The current result is consistent with the findings of Nivetha et al. in India, where moderate stress was the most common (74%), followed by mild stress (20%) and severe stress (6%) (35). Likewise, a study in Russia reported that the prevalences of students suffering from mild,

moderate, and severe stress were 26.0%, 69.1%, and 4.9%, respectively (36). These findings indicate that students majoring in healthcare encounter various stressors in medical universities, including rigorous academic requirements, demanding curricula and learning environments, personal life events, and psychological pressures that are challenging to manage (3, 7, 37). Nevertheless, our findings differed from those of students in Saudi Arabia, where the rates of mild, moderate, and severe stress were 20.4%, 18.2%, and 25%, respectively (38).

The current results also contrast with those of a study from Poland, where the proportions of high, medium, and low stress levels were 66.9%, 22.1%, and 11.0%, respectively (39), and with the results of a study from Turkey, where the percentages were 71.2%, 23%, and 5.6%, respectively (40). The incidence of mental health issues among university students in Southeast Asia is also significant (41). In particular, approximately 49.3% and 33.2% of Chinese and Thai undergraduate students, respectively, reported experiencing stress. The study reported the following percentages of mild, moderate, severe, and extremely severe stress across four Southeast Asian nations: 14.7%, 12.6%, 5.9%, and 2.9%, respectively (34). These disparities in stress levels may be ascribed to differences in educational environments, curricula, regional sociocultural influences, the psychometric instruments used, and the specific geographical areas (36). Furthermore, the evaluation of stress is inherently subjective and may fluctuate over time (3). Therefore, our research serves as a fundamental groundwork for monitoring students' mental health and providing counselling or psychological services. This effort involves coordinated actions between health and education organisations to deliver timely support.

Stressors and Coping Strategies

Responsibilities at the university level differ significantly from those in high school and are more demanding (42). Among stressor domains, ARS had the highest mean±SD, 2.44±0.82. According to a study by Fuad et al., preclinical students were selected to identify issues early, enabling them to better cope with future stress during clinical years, as research has shown that stress levels remain consistently high during medical education and physician training (43). The clinical group experienced greater mean±SD values across all stressor domains than the preclinical group ($p \leq 0.05$), including ARS, IRS, TLRS, SRS, DRS, and GARS (Table 2). Any form of stress that exceeds its threshold limit may result in adverse physical and psychological repercussions for students (44). Study-related stress is the most dominant type of stress among healthcare students, which may be explained by the rigorous curricula in pharmacy and medicine, along with the substantial academic workload and prolonged duration of study (3, 7, 37, 45). This aligns with previous studies conducted in Bangladesh and Malaysia and a systematic review showing that the primary sources of stress were academics, followed by group activities, learning and teaching, and interpersonal and intrapersonal factors (42, 44, 46).

A study in Bangladesh found that a measurable level of academic stress affects more than half of Bangladeshi medical students, highlighting the need for authorities to intervene and foster a better educational atmosphere (42). According to Abas et al., clinical medical students experienced higher levels of depression, anxiety, and stress compared to preclinical medical students (47). The reasons for this effect were assumed to include restrictions on clinical students' physical interactions with patients needed to refine their clinical skills, preoccupation with household responsibilities, anxiety about final examinations, and apprehension regarding their competence as future doctors (47). Ultimately, the majority of research in Southeast Asia highlights age and gender as significant predictors of

psychological distress, often indicating that younger females face higher risks, regardless of the study cohorts examined (48–50). Although gender-associated stressors, such as societal expectations and workload, were not explored in our research, investigating them could provide additional insights into the unique challenges faced by medical students in Vietnam.

Stress can be addressed through coping, which involves employing various methods and approaches to adapt (51). Coping is characterised as a form of adaptation initiated by individuals in exceptionally challenging circumstances. It is defined as an individual's continuous cognitive and behavioural efforts to manage demands that are especially challenging and may exceed their resources or abilities (47, 51). Research among 990 Bangladeshi medical undergraduate students revealed that 82% of the participants believed that their coping strategies helped reduce stress, while 18% found them ineffective (42). In the current research, the mean±SD for active coping under PFS and substance use were 6.07±1.72 and 3.35±1.82, respectively. The clinical group showed higher mean±SD values for active coping and substance use than the preclinical group ($p \leq 0.05$) (Table 2). This may be explained by the fact that the clinical group likely employs active coping techniques more often due to the direct and immediate challenges encountered in clinical practice, such as patient care management and navigating complex situations. Conversely, preclinical students predominantly concentrate on academic information and examinations, which may not elicit the same degree of immediate necessity for proactive coping strategies.

However, a study among Thai healthcare students reported no notable difference in the coping strategies used by clinical and preclinical medical students (19). According to the researchers, Thai medical students employed adaptive coping techniques, such as practicing acceptance, distracting oneself, positive reframing, and active coping, rather than dysfunctional methods, such as behavioural disengagement, denial, and drug use (19). Another study conducted among nursing students in Malaysia reported that the most frequently practised coping strategies were prayer (religion), planning, and acceptance (46). These findings suggest that while coping strategies vary by region and discipline, prospective and longitudinal research could provide deeper insights into how students adapt their coping strategies from the preclinical to the clinical stage.

Coping mechanisms can include PFS, EFS, and PAS. First, PFS, including active coping, planning, and instrumental support, exhibited a positive correlation with stress domains, notably ARS and IRS, with planning demonstrating the most significant correlation ($r = 0.196$, $p < 0.01$) in the current research. Second, emotion-focused methods, including positive reframing and acceptance, exhibited modest but significant relationships with ARS and IRS (e.g., acceptance: $r = 0.128$, $p < 0.01$), indicating moderate use of these strategies. Moreover, PAS, such as self-blame, behavioural disengagement, and venting, exhibited a significant correlation with stress domains, notably ARS (self-blame: $r = 0.326$, $p < 0.01$) and DRS (behavioural disengagement: $r = 0.224$, $p < 0.01$), underscoring their relationships with heightened stress levels (Table 3).

These results align with previous studies that found dysfunctional coping to be significantly linked with perceived psychological distress among university students from the Philippines, Indonesia, Thailand, Malaysia, the United Kingdom, and the United States (52). Moreover, stress was significantly associated with self-blame among Malaysian students (Adjusted Odds Ratio [AOR]: 8.18, 95% CI: 1.86–35.91), which was the only coping strategy identified (46). In the Philippines, a significant positive correlation was observed between academic stress and coping styles, such as active and passive emotional coping, as well as active and passive problem-focused coping (53). More notably, research on cross-cultural disparities between Western and Eastern countries concluded that higher levels of stress and poorer

psychological health were reported by students from individualistic cultures compared to those from collectivistic cultures; more precisely, students from collectivistic cultures were more likely to adopt emotion- and problem-focused coping methods and dysfunctional strategies (52). Based on these arguments, offering mental health support to university students is crucial for developing effective, evidence-based, and culturally sensitive coping strategies that address their psychological distress.

Gender disparities were apparent, with females exhibiting a greater propensity for PFS and EFS (e.g., acceptance and emotional support), in line with studies conducted in Canada and the United States (54, 55). These strategies can strengthen the emotion-focused coping methods currently utilised by students. When dealing with stress, females in this demographic might direct blame towards internal or external sources (55). Meanwhile, males demonstrated a stronger correlation with substance use ($r = –0.180$, $p < 0.01$), consistent with a study conducted in Pakistan (56). College males generally seek fewer support resources, which may be attributed to either a lack of social connections or insufficiently developed coping skills (57). Both genders can benefit from cultivating emotional regulation and connection skills, which help decrease stress and promote lasting relationships (55). These findings suggest that gender factors and social roles can significantly influence coping behaviours, depending on the degree to which "masculine" (e.g., instrumental and agentic) or "feminine" (e.g., emotional and communal) traits are accepted and reinforced (15, 58). In terms of EFS, male students were found to employ humour as a crucial coping mechanism more frequently than females. Similar to the current findings, a study from Malaysia identified humour as one of the least-used coping mechanisms, although it was particularly important for male students (47). More precisely, male students employed humour as a social tool to enhance their personalities. Overall, these findings indicate that although students frequently employ active and planning-oriented methods, interventions are necessary to mitigate reliance on maladaptive strategies, such as self-blame and behavioural disengagement, which are significantly associated with increased stress levels.

Factors Associated with Stress in Medical Students

As shown in Table 4, female students were more likely to report higher mean stress scores than their male counterparts (β = 0.145, 95% CI: 0.071–0.220). Students who did not employ PFS and PAS exhibited greater mean stress scores than those who did (β = 0.087, 95% CI: 0.051–0.122, and β = 0.238, 95% CI: 0.200–0.276, respectively). Similarly, a previous study reported that female students experienced greater stress than male students across all studied areas (37). These findings underscore that females are generally more vulnerable to varying levels of stress. Furthermore, females tend to experience heightened stress in competitive environments and encounter increased interpersonal disputes.

However, contrary to the general understanding of psychological distress and findings from other studies, the female gender in Malaysia appeared to act as a protective factor. This observation warrants careful consideration, as the sample was predominantly female (70%), which may have influenced the outcomes (43). At the same time, previous research has also indicated that male medical students exhibit higher levels of distress compared to their female counterparts and rely more frequently on ineffective coping mechanisms, such as denial, self-blame, and substance abuse (56). These findings diverge slightly from prior literature, in which females are typically reported to exhibit higher levels of discomfort. Given that these investigations were conducted in both Eastern and Western nations, further research is necessary to determine the extent to which cultural and environmental

factors influence the coping mechanisms of male and female medical students. Our study shows that students need to adopt effective coping strategies to improve their well-being. Therefore, it is crucial to provide them with the necessary training to help them manage their high levels of perceived stress.

Strengths and Limitations

There is a scarcity of research on stress, stressors, and related factors among healthcare students in Vietnam. Nevertheless, our research offers valuable insights by utilising a large sample of 1,387 students enrolled in medical programmes across all academic years. The reliability of our findings is supported by the MSSQ scale and the Brief COPE, which have high Cronbach's α values (0.937 and 0.903, respectively), indicating excellent internal consistency, and all coefficients of correlation for the item-total variable greater than 0.30. The questionnaires used in this investigation were straightforward and easy to understand, thereby allowing students to accurately convey their perspectives.

Despite its contributions to understanding stress among undergraduate students, our research has certain limitations. First, it employed a cross-sectional design, which evaluates stress only at a specific point in the students' academic path. In this context, longitudinal research is necessary to examine the ongoing and significant relationships between the independent and dependent variables associated with stress. Second, while the MSSQ and the Brief COPE are effective tools for assessing stress and coping strategies, broader psychological and societal aspects have not been investigated. Therefore, future studies should involve specialised clinicians to facilitate the diagnosis of psychiatric illnesses and ensure the provision of timely treatment. Additionally, the use of self-administered questionnaires may have introduced bias. This could be addressed in future research by incorporating in-depth interviews and observations to improve data accuracy and provide more nuanced insights into stress among healthcare students.

CONCLUSION

This study highlights the multifaceted nature of stress among medical students, with ARS emerging as the most prominent stressor, followed by GARS and SRS. Clinical students reported higher levels of ARS, TLRS, and GARS than preclinical students, reflecting the demands of patient care and professional preparation. In contrast, preclinical students experienced higher levels of SRS, likely due to transitional challenges in early medical education. EFS such as positive reframing and acceptance, were the most commonly used coping mechanisms, while PAS, including self-blame and behavioural disengagement, were strongly associated with elevated stress across domains. PFS such as active coping and planning, were positively correlated with stress, suggesting that their use reflects ongoing engagement with stressors. Female students exhibited significantly higher stress scores than males, underscoring the need for gender-sensitive interventions.

These findings emphasise the importance of encouraging the adoption of adaptive coping mechanisms and addressing maladaptive behaviours to mitigate stress. Institutions should implement evidence-based policies, such as stress management workshops, peer support systems, and gender-specific counselling, tailored to the unique challenges faced by clinical and preclinical students. Integrating mental health literacy and coping strategies into the medical curriculum may equip students with the necessary tools to navigate academic and personal challenges effectively. Future research should explore longitudinal patterns

of stress and coping strategies to better address the evolving needs of healthcare students, ultimately enhancing their well-being and professional development. Finally, although our study did not explore gender-associated stressors, such as societal pressures or workloads, examining them in future research could reveal critical insights into the specific challenges faced by students in Vietnam.

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ETHICAL APPROVAL

This study was approved by the Ethics Committee of Biomedical Research at Can Tho University of Medicine and Pharmacy (IRB approval number 22.018.GV/PCT-HDDD). The study utilised an anonymous internet-based survey. Participation was voluntary, and no penalties were imposed for declining participation. The participants were provided with all necessary information about the study to ensure that they could make an informed decision about whether to complete the questionnaire. By agreeing to the information provided and submitting the completed survey, the participants gave their implied consent.

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