

The Relationship Between Burnout, Stress, And Resilience Among Vietnamese Health Care Workers

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ABSTRACT

Introduction: The COVID-19 pandemic has also caused significant damage in Vietnam, necessitating medical personnel to work tirelessly at different medical establishments to combat the epidemic. Healthcare professionals in Vietnam may experience stress and burnout, leading to adverse effects on their resilience, job performance, health, and overall quality of life.

Methodology: We carried out a cross-sectional investigation involving 147 healthcare professionals from various medical establishments in Ho Chi Minh City, Vietnam. The purpose was to evaluate the levels of stress, burnout, and resilience among these individuals.

Results: The study discovered that resilience acts as a mediator in the association between stress and burnout. Additionally, it revealed that gender traits have an impact on the interplay between stress and mental resilience. The study additionally discovered inequalities in stress, burnout, resilience, and social support based on demographic and professional factors.

Conclusion: Our study has enhanced our comprehension of mental health concerns among healthcare workers and facilitated the identification of a complex pattern that takes into account detrimental factors, protective factors, and existing support systems in mental healthcare, thus offering comprehensive and insightful perspectives for future research.

Keywords: burnout, stress, social support, healthcare workers, resilience

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INTRODUCTION

Vietnam has experienced four waves of COVID-19, with subsequent waves exhibiting an increase in cases.¹ Before April 2021, the country had effectively controlled the pandemic and had a low number of confirmed cases, with most cases occurring in individuals entering the country.² As a result of proactive disease prevention measures, the number of confirmed cases was minimal, with the bulk of confirmed cases occurring in individuals entering.³ However, on April 27, 2021, Vietnam began its fourth wave of the pandemic.¹ In this wave, there were 1,235 and 230 confirmed cases, respectively. As of November 30, 2021, the country had an average of 12,560 infections per 1 million people and 25,252 fatalities.⁴ The increased number of cases put a strain on frontline healthcare workers, resulting in longer working hours and an increased workload.⁵

Healthcare workers were compelled to work longer shifts to accommodate the increasing demand for healthcare services.⁶ In a relatively short time, the pandemic caused by COVID-19 had a profound impact on healthcare systems worldwide and imposed significant pressure on the lives of millions of people, particularly healthcare workers.⁷ Dealing with patients who are isolated and carrying the virus daily can elicit a range of emotions, including fear of death, loneliness, and anger, which can ultimately lead to stress among healthcare workers.⁸ Given Vietnam's limited financial and human resources for healthcare, as well as its inadequate healthcare infrastructure, Vietnamese healthcare workers may encounter challenges such as insufficient protective equipment, increased workload, and additional responsibilities.⁹ During the nationwide partial lockdown, healthcare workers spent more time in hospitals, which may have contributed to decreased family contact, loneliness, exhaustion, frustration, and discrimination.^{9,10}

Stress and burnout among healthcare workers during the global pandemic COVID-19

Healthcare workers who have been on the frontlines of the COVID-19 pandemic for over two years since 2020 have reported an increase in mental health disorders such as anxiety, depression, and low resilience.¹¹ In a survey of 774 frontline health workers in Vietnam conducted shortly after the first COVID-19 wave in April 2020, the prevalence of psychological stress among healthcare workers was high.¹² During the second wave of the COVID-19 pandemic in Vietnam, with Da Nang as the epicenter, the stress levels of 746 healthcare workers in Da Nang were measured. Results showed that 44.6% of healthcare workers reported increased stress, while 18.9% reported severe or extremely severe stress. Factors associated with stress included longer work hours, employment in healthcare facilities that provide COVID-19 treatment, direct contact with patients or their bio samples (such as physicians, nurses, and la-

boratory workers), low confidence in available personal protective equipment, and a lack of knowledge about COVID-19 prevention and treatment.⁵ Furthermore, healthcare workers who are subjected to not only a heavy workload but also interpersonal strains such as violent abuse from patients may experience additional stress. Therefore, doctors are calling for stricter penalties for violent behaviors against doctors and nurses in hospitals.¹³

Healthcare professionals are at the forefront of battling the pandemic. Due to the prolonged COVID-19 outbreak, there is a heightened risk of occupational burnout among these workers.¹⁴ The primary causes of burnout during pandemics such as COVID-19 include extended working hours and the fear of contracting the virus.¹⁵ An individual's burnout is likely to occur if stress persists for a prolonged period.¹⁶ Effective management of stressors that lead to burnout is crucial in preventing it.¹⁷ Studies conducted in Europe and globally have found that medical personnel experience anxiety disorders, depression, burnout, emotional exhaustion, and reduced job satisfaction due to the virus.¹⁸

The resilience of healthcare workers in the COVID-19 status

An extensive examination of research on resilience during the COVID-19 pandemic demonstrated that promoting resilience among healthcare workers can act as a protective measure against distress, anxiety, and depression, as well as adverse job-related consequences including burnout.¹⁹ Moreover, possessing a heightened level of resilience has been associated with favorable work-related consequences, including an increased likelihood of receiving a COVID-19 vaccination, facilitating post-traumatic growth, and preventing burnout.²⁰ Furthermore, research has shown that resilience plays a role in mediating the relationship between health and the performance of healthcare systems.²¹ Prior studies on healthcare professionals amid the COVID-19 epidemic have indicated that psychological resilience acts as an intermediary between depression, perceived stress, personal burnout, and mental health.^{22,23} In a study conducted by West et al. (2020), a group of 5445 physicians in the United States was analyzed. The study revealed a noteworthy correlation between resilience and a decrease in the occurrence of burnout symptoms. Nevertheless, it is crucial to acknowledge that even among the most robust doctors, the incidence of burnout persisted at an unacceptably high level.²⁴

Healthcare workers' social support in the COVID-19 status

Amidst the epidemic, there was a surge in public concern and safeguarding measures for healthcare professionals, leading to the creation of a comprehensive, organized, and efficient social support system.²⁵ A study has shown that social support serves as a safeguard for the emotional well-being of healthcare workers in Asia amidst the COVID-19

pandemic.²⁶ Insufficient social support at work, certain medical conditions, excessive work hours without breaks (over 60 hours per week), irregular spiritual practices, and frequent direct contact with COVID-19 patients all markedly elevate the likelihood of burnout among healthcare professionals.²⁷

The objective of this study was to examine the stress and burnout levels experienced by healthcare workers and to explore the correlation between stress, burnout, and resilience capabilities among healthcare workers in Vietnam. This study establishes a scientific basis for reducing psychological problems and developing suitable intervention strategies for primary healthcare workers following the COVID-19 pandemic.

METHODOLOGY

Hypothesis

Hypothesis 1: Burnout would be negatively associated with resilience among healthcare workers in Vietnam.

Hypothesis 2: Burnout would be positively associated with stress among healthcare workers in Vietnam.

Hypothesis 3: Stress would be negatively associated with resilience among healthcare workers in Vietnam.

Hypothesis 4: Gender would moderate the relationship between burnout and stress among healthcare workers in Vietnam.

Hypothesis 5: Stress would mediate the relationship between burnout and resilience among healthcare workers in Vietnam.

Participants: The data was collected between May and November of 2021. A total of 300 questionnaires were distributed and sent to the healthcare workers of different medical facilities in Vietnam. Following the elimination procedure, 153 responses were judged unsuitable for analysis due to insufficient information or identical responses to all questions. The final sample included 147 replies (49% response rate), which is greater than the 30% response rate required by the majority of researchers for the study.²⁹

Ethical Aspects: The American Psychological Association's (APA) ethical guidelines for research involving human participants and the Declaration of Helsinki were both reviewed and approved by our studies.

Instrument

The COVID-19 Pandemic-Related Stress Scale (PSS): In light of the worldwide spread of coronavirus disease (COVID-19), the COVID-19 Pandemic-Related Stress Scale (PSS-10-C) was developed by Campo-Arias et al. (2020)³⁰ to measure the level of stress participants experienced in the past month

based on the Scale of Perceived Stress (PSS-10).³¹ The PSS-10-C comprises 10 items. Each item was responded to on a 4-point Likert scale ranging from one to five (0 = never, 1 = almost never, 2 = occasionally, 3 = almost always, and 4 = always). Items 4, 5, 7, and 8 are inverse variations. Campo-Arias et al. (2020) reported that the dependability of the FCV-19S is satisfactory, and the internal consistency has a Cronbach's alpha of 0.86. In the EFA, the Bartlett test showed $\chi^2 = 1,399.35$; degrees of freedom = 54; $p < .001$; and KMO = 0.82. A single factor was identified, with an eigenvalue of 4.42, which explained 44.2% of the total variance. The observed scores were between 0 and 36 (16.5 ± 7.3).

This study employed The Related Stress Scale (PSS-10-C) (Vietnamese) - Vietnamese version.³² The translation into Vietnamese was conducted using a standardized method (translate, culturally verify, and back-translate). In Vietnam, the standard translation of the PSS has been completed, and positive psychometric properties have been reported. The Cronbach's alpha for the V-PSS-10 was .80, and the test-retest correlation at one month's interval was 0.43.³²

The reliability and validity of this scale have been demonstrated to be high, and it has been utilized in various populations and settings around the world.³³ According to research by Thai et al. (2021), the Vietnamese version of the COVID-19 Pandemic-Related Stress Scale (PSS-10-C) has adequate psychometric properties, with Cronbach's alpha of 0.79.³⁴

The Brief Resilience Scale (BRS): The BRS scale measures subjects' resilience as a coping strategy to stress. BRS was developed by Smith et al., (2008), including six items, and items 2, 4, 6, and 8 are inverse variations. The respondents were asked to indicate how well each statement described their behavior and actions on a 5-point Likert-type scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree." The higher the score, the greater the degree of resilience the person shows to deal with adversity.

Internal consistency was good, with Cronbach's alpha ranging from 0.80 to 0.90.³⁵ According to several research, the BRS scale during the COVID-19 pandemic was Good internal consistency (Cronbach's alpha ranging from 0.80-0.91) and good test-retest reliability (intraclass correlation of 0.62 and 0.69) reported,³⁶ and the internal consistency in the resilience scale in Spanish Health Personnel during the COVID-19 Pandemic reported of 0.83.³⁷

The Multidimensional Scale of Perceived Social Support (MSPSS): The Multidimensional Scale of Perceived Social Support (MSPSS).³⁸ This instrument measured emotional and instrumental support from three sources: friends, family, and significant others, and was assessed using a questionnaire that included 12 items. The participants expressed their level of agreement using a seven-point Likert scale (1= Very strongly disagree, 2= Disagree, 3= Somewhat disa-

gree, 4= Neither agree or disagree, 5= Somewhat agree, 6= Agree, and 7= Very strongly agree). The higher the sum score, the higher the level of social support. The Cronbach's alphas for the overall scale were 0.85.³⁸

Multiple studies indicate that the instrument has adequate psychometric properties for use with adults [109, 110]. In the study by Grey et al. (2020) conducted during the COVID-19 pandemic, Cronbach's alpha coefficient and the intraclass correlation coefficient (ICC) for this tool were 0.89 and 0.92. In a study of healthcare workers, Cronbach's alpha for the MSPSS scale was found to be 0.93.⁴¹

The COVID-19 Burnout Scale (COVID-19-BS): The COVID-19 Burnout Scale (COVID-19-BS) in the context of the COVID-19 pandemic was developed by Yildirim and Solmaz (2022)⁴² based on The Burnout Measure-Short Version by Malach-Pines (2005)⁴³. The reliability of the COVID-19-BS was assessed using Cronbach's as a measure of internal consistency and was 0.92⁴². The COVID-19-BS consists of ten items that assess an individual's level of physical exhaustion, emotional exhaustion, and mental exhaustion based on the main of burnout's core constructs.

Participants were asked to rate the extent to which their jobs cause them to feel tired, disappointed, hopeless, trapped, depressed, physically exhausted/sick, worthless/sense of failure, difficulty sleeping, and unwillingness to continue doing the job. Each item is evaluated using 5-point Likert-type responses (0 = never, 1 = almost never, 2 = occasionally, 3 = almost always, and 4 = always).

The BMS-10 was extensively utilized on a variety of

populations in several studies.^{43,44} The BMS was validated on a sample of Arabs (including an occupational sample from a healthcare setting) and has shown satisfactory psychometric properties regarding internal consistency and reliability with a Cronbach $\alpha = 0.85$.⁴³ In the study by Alrawashdeh et al. (2020) during the COVID-19 crisis, the Cronbach α for the 10-item BMS was 0.91.⁴⁵

Procedures: Our study collected data using a survey to staff in health facilities. The respondents were sent invitations to participate in the study via email and social media. The inclusion criteria are HCWs working in Vietnam's healthcare facilities and their willingness to volunteer for the study. HCWs were defined as individuals who provide and administer care and services to patients.⁴⁶ Excluded from the study were those employed in sectors unrelated to health care, as well as those employed in health facilities but not directly involved in providing care and services to patients.

Before taking the survey, participants were informed of the conditions of anonymity, confidentiality, and their obligations, and the issue of the right to withdraw from the study was addressed in the information sheet. As a result, if individuals were unable to continue with the study, they might opt out. It took between 10 and 15 minutes to complete the survey. If participants needed clarification during the survey, they were instructed to contact the research team by email or phone. Regarding the questionnaires, participants were told of the goal of the study and requested to supply information such as their gender, career, workplace, work hours, and marital status.

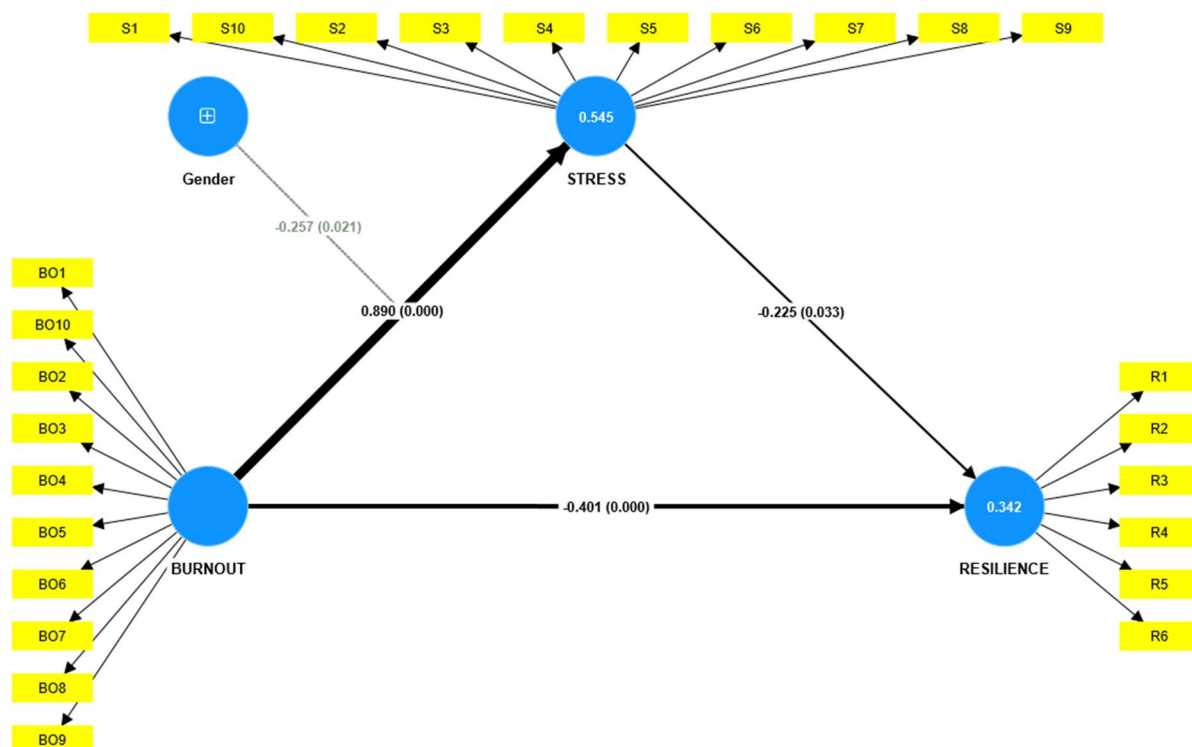


Figure 1: Hypothetical model

Items on the four scales in this study include the COVID-19 Pandemic-Related Stress Scale (PSS-10-C) and the Brief Resilience Scale. The Multidimensional Scale of Perceived Social Support (MSPSS) and the COVID-19 Burnout Scale (COVID-19-BS) and measures were forward and back-translated in this study. Subsequently, all members of the research team decided to reconcile the initial Vietnamese translation to give an adequate final version for backward translation. The back-translation from Vietnamese to English was performed by an English translator who is a native speaker of English and is also fluent in Vietnamese. After getting the back-translation, the study team compared it to the original scale to see if there were any inconsistencies or conflicts between the two versions. After analyzing the application of the scale, no issues were found, and the final Vietnamese versions of all scales were approved for use.

Data analysis: The Statistical Package for the Social Sciences (SPSS), version 22.0, was used to analyze the data. The Mann-Whitney U test was used to compare differences between two separate groups, and the Kruskal-Wallis H test was used to see if the differences between groups were statistically significant. This is because the dependent variable is either ordinal or continuous but not normally distributed.

Smart partial least squares (Smart PLS)-SEM analysis and variance-based structural equation modeling in the most recent version of Smart PLS 4 were used to analyze the data collected for this investigation.⁴⁷ The measurement model was checked for conver-

gent validity (average variance extracted), discriminant validity (HTMT criteria), construct reliability (Cronbach's alpha (CA)), and reflective indicator reliability (outer loading). To judge the structural model, we look at the variance inflation factor (VIF), the coefficient of determination (R²), the effect size f², and the significance and relevance of the path coefficients. We used a full PLS-SEM analysis with 1000 bootstrap samples to find path coefficients, P-values, and specific, indirect, direct, and total effects. Although 5000 sample bootstrapping is commonly used, our study utilized only 1,000 sample methods due to the small sample size (n = 147), as shown in Figure 1.

RESULTS

Due to the sampling technique, the final data set contained no missing information. Table 1 displays the sample's characteristics. About socio-demographic characteristics, the data set involved n = 81 males (34.9%) and n = 151 females (65.1%). Of the total sample, there were 149 participants from Ho Chi Minh City (64.2%) and 83 participants from other provinces (35.8%). Regarding marital status information, 60.3% are single, 38.4% are married, and 1.3% are separated. Places of work in 56.5% public health facilities, 16.8% private medical facilities, 22.4% treatment field hospitals, and 4.3% other places of work. Going home level, 27.2% return home daily, 3% one week, 12.5% two weeks, 7.3% three weeks, and 50% more than 3 weeks.

Table 1: Sample Descriptive Characteristics

	Total (n=147)	Stress		Burnout		Resilience		Social support	
		Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p
Gender^a			0.58		0.84		0.92		0.93
Male	54(36.7)	3.59±0.48		2.64±0.72		3.19±0.48		5.16±1.27	
Female	93(63.3)	3.60±0.44		2.66±0.71		3.18±0.51		5.05±1.51	
Marital status^a			0.03		0.01		0.07		0.21
Single	93(63.3)	3.65±0.45		2.77±0.70		3.12±0.48		5.03±1.32	
Married	54(36.7)	3.49±0.45		2.45±0.68		3.28±0.52		5.20±1.59	
Workplace^b			0.09		0.31		0.59		0.94
Public Hospital	82(55.8)	3.67±0.46		2.74±0.69		3.16±0.50		5.11±1.45	
Private Hospita	23(15.6)	3.52±0.46		2.40±0.75		3.28±0.53		5.01±1.37	
Field Hospital	35(23.8)	3.51±0.43		2.65±0.70		3.20±0.47		5.16±1.39	
Other medical facilities	7(4.8)	3.36±0.40		2.43±0.68		3.05±0.62		4.88±1.66	
Number of members in family^b			0.02		0.05		0.13		0.78
Alone	11(7.5)	3.85±0.26		3.12±0.63		2.89±0.37		5.43±1.09	
One person	16(10.9)	3.74±0.47		2.79±0.67		3.10±0.47		5.48±1.01	
Two people	33(22.4)	3.44±0.45		2.55±0.59		3.20±0.46		4.88±1.63	
Three people	34(23.1)	3.66±0.41		2.79±0.70		3.12±0.55		5.08±1.20	
More than three people	53(36.1)	3.55±0.48		2.49±0.77		3.29±0.50		5.04±1.58	
Come home frequency^b			0.02		0.04		0.11		0.10
Everyday	36(24.5)	3.64±0.40		2.46±0.67		3.15±0.45		4.76±1.48	
Once a week	5(3.4)	3.86±0.43		2.84±0.54		3.17±0.55		6.05±1.11	
Biweekly	20(13.6)	3.34±0.42		2.52±0.74		3.42±0.58		5.53±1.28	
Triweekly	11(7.5)	3.96±0.34		3.21±0.65		2.91±0.43		5.33±1.56	
Once a month	75(51.0)	3.57±0.47		2.69±0.70		3.17±0.49		5.04±1.40	

Abbreviations: M, mean; SD, standard deviation; n, number of participants; %, frequency

Note: a, Mann-Whitney U; b, Kruskal-Wallis H test

Table 2: Test of Normality Distribution

	Kolmogorov-Smirnova		Shapiro-Wilk	
	Statistic	Sig.	Statistic	Sig.
Stress	0.07	0.03	0.98	0.15
Burnout	0.08	0.02	0.98	0.28
Resilience	0.08	0.01	0.98	0.06
Social support	0.11	<0.001	0.91	<0.001

Since our sample size exceeded 50 observations, we used the Kolmogorov-Smirnov test to determine the normality of the gathered data.⁴⁸ Results in Table 2 indicate that all scales—STRESS, BURNOUT, RESILIENCE, and SOCIAL—were non-normally distributed as the p-values were less than 0.05. Therefore, the Mann-Whitney U test and the Kruskal-Wallis test were conducted to compare differences between independent groups.

A Mann-Whitney U test was performed to evaluate whether the level of four aspects—stress, burnout, resilience ability, and social support—differed by gender. The results indicated that there was no significant difference between males and females on stress ($z = -0.58$, $p = 0.58$), burnout level ($z = -0.19$, $p = 0.84$), resilience ability ($z = -0.10$, $p = 0.92$), or social support level ($z = -0.08$, $p = 0.93$).

Besides, the Mann-Whitney U test result also showed the difference between the two to distinguish the material status of stress and burnout. The data showed that single staff (Mdn = 3.60) had a significantly greater stress level than married staff (Mdn = 3.40) ($z = -2.12$, $p = 0.03$), and for burnout level, single staff (Mdn = 2.70) had a significantly greater stress level than married staff (Mdn = 2.45) ($z = -2.54$, $p = 0.01$). Meanwhile, the results indicated that there was no significant difference between single staff and married staff in resilience ability ($z = -1.79$, $p = 0.07$) and social support level ($z = -1.25$, $p = 0.21$).

A Kruskal-Wallis test was conducted to determine whether there is an effect of the workplace on the level of stress, burnout, resilience ability, and social support. There were no statistically significant changes in the distribution of stress [$\chi^2(3) = 6.35$, $p = 0.09$], burnout [$\chi^2(3) = 3.55$, $p = 0.31$], resilience [$\chi^2(3) = 1.87$, $p = 0.59$], and social support [$\chi^2(3) = 0.37$, $p = 0.94$] characteristics by workplace.

Simultaneously, we also used the Kruskal-Wallis H test to determine whether the level of stress, burnout, resilience ability, and social support were changed because of the come-home frequency or the number of members in the family. However, there were no statistically significant differences across the come-home frequencies in resilience distribution [$\chi^2(4) = 16.59$, $p = 0.02$] and social support distribution [$\chi^2(4) = 9.80$, $p = 0.044$]. Additionally, there were no statistically significant changes in burnout distribution [$\chi^2(4) = 9.19$, $p = 0.56$], resilience distribution [$\chi^2(4) = 7.07$, $p = 0.13$], and social support distribution [$\chi^2(4) = 1.72$, $p = 0.78$] characteristics

by the number of members in the family.

Otherwise, according to the Kruskal-Wallis H test results, there were statistically significant changes in stress distribution [$\chi^2(4) = 9.80$, $p = 0.044$] and burnout distribution [$\chi^2(4) = 16.59$, $p = 0.002$] characteristics by come home frequency. And there was another statistically significant change in stress distribution [$\chi^2(4) = 11.31$, $p = 0.023$] characteristics by the number of members in the family.

Result of Structural Equation Model Analysis

Assessment of the Measurement Model: The common factor model was assessed using Cronbach's alpha, composite reliability, AVE, and the HTMT criterion, as well as internal consistency reliability, convergent validity, discriminant validity, determination of coefficients, and effect size.⁴⁹ In addition, genders were dummy coded into 0 = "male", and 1 = "female".

Construct Reliability: CA and CR were used to assess internal consistency and reliability. The interval of 0.60-0.70 is considered "acceptable in exploratory research," while 0.70-0.90 is "adequate to good," and this requirement is for both CA and CR.⁵⁰ The values of Cronbach's alpha and CR for each construct are shown in Table 3.

Convergent Validity: The extracted average variance is used to evaluate the measurement's convergent validity. The minimum admissible AVE is 0.50; an AVE of 0.50 or higher indicates that the construct explains at least 50% of the variation in the construct's indicators.⁵⁰ However, if the CR is larger than 0.60, an AVE of less than 0.50 is sufficient.⁵¹

Discriminant Validity: In addition to Fornell and Lacker's (1981) criterion and cross-factor loading, the HTMT criterion is an advanced method recently proposed by Dijkstra and Henseler (2015) and widely used to evaluate the discriminant value of a scale.⁵² As Hair et al. (2021) say, the discriminability of the reflective model is proven if the HTMT value of each pairwise construct does not go over the 0.9 threshold.⁵⁰ Table 4 depicts the HTMT values along with the HTMT confidence interval.

Table 3: Results of the reflective measurement model

Construct and items	α	CR	AVE
Stress	0.740	0.822	0.325
Resilience	0.597	0.685	0.339
Burnout	0.894	0.908	0.520

Table 4: Heterotrait-monotrait (HTMT) criterion

	Stress	Resilience	Burnout	Gender
Stress	0.570	-	-	-
Resilience	-0.517	0.582	-	-
Burnout	0.728	-0.564	0.721	-
Gender	-0.005	0.033	0.016	1.000
Gender x burnout	0.510	0.563	0.833	0.008

Note: No value

Assessment of the structural model

Collinearity statistics (VIF): To figure out how bad the structural model's collinearity problem is, the variance and inflation factor values of the variables are measured. Collinearity occurs when two indicators exhibit a strong correlation. According to Table 5, all VIF values are less than 5.0, so the VIF values did not reveal any instances of collinearity in the obtained data.⁵³ We assess the following sets of (predictor) constructs for collinearity: (1) BURNOUT predicts RESILIENCE and STRESS; (2) STRESS predicts RESILIENCE.

Determination of coefficient (R2): R2 is a measure of the predictive accuracy of the model. By looking at the coefficients of determination, you can see how much of the variation in the endogenous constructs the structural model can explain. R2 should be greater than 0.1,⁵⁴ which is a significant threshold.⁵⁵ This study found that 34.2% of the variance occurred in reliability, explained by exogenous.

Effect size: f2: The researcher is able to observe the effect of each exogenous construct on the endogenous construct by assessing the effect size. The f2 values in this study fall within the Cohen (2013) suggested range.⁵⁶ BURNOUT to STRESS is 0.646.

Results of the PLS-SEM analysis: We found that the

model explained 33.3% of the variance in the reliability with both direct and indirect effects. Results based on 1000 bootstrapped samples depicted a presentation of direct effects from gymnastics and age. The results from Table 6 supported Hypotheses 1, 2, and 3: a negative effect of BURNOUT on RESILIENCE [$\beta = -0.401, p < 0.001, 95\% \text{ CI} = (-0.579; -0.184)$], a positive effect of BURNOUT on STRESS [$\beta = 0.890, p < 0.001, 95\% \text{ CI} = (0.740; 1.038)$], and a negative effect of STRESS on RESILIENCE [$\beta = -0.225, p < 0.05, 95\% \text{ CI} = (-0.442; -0.032)$].

Hypothesis 5 was confirmed as the indirect effect of burnout on resilience through stress was significant [$\beta = -0.200, p < 0.05, 95\% \text{ CI} = (-0.386; -0.029)$]. and because BURNOUT was earlier proven to have a negative direct impact on RESILIENCE, which confirmed the complementary partial meditation role of STRESS. The negative impact of stress on resilience [$\beta = -0.225, p < 0.05, 95\% \text{ CI} = (-0.442; -0.032)$] was reported. Moreover, the moderation effect of gender on the relationship between burnout and stress was examined. When interpreting the results of a moderation analysis, the direct effect of gender x BURNOUT on stress [$\beta = -0.257, p < 0.05, 95\% \text{ CI} = (-0.463; -0.020)$] Therefore, Hypothesis 4 was supported. All direct effects were statistically significant at the 2.5% level, and the value of 0 was not included in the 95% confidence intervals.

Table 5: Collinearity statistics variance inflation factor (VIF)

	Stress	Resilience	Burnout	Gender	Gender x burnout
Stress	-	-	-	-	-
Resilience	2.126	-	-	-	-
Burnout	2.699	2.126	-	-	-
Gender	1.000	-	-	-	-
Gender x burnout	2.699	-	-	-	-

Note: No value

Table 6: Results of PLS-SEM analysis

Path	β coefficient	t	p	95% CI	95% BC CI
Direct effects					
Burnout -> Resilience	-0.401	4.095	<0.001	[-0.579; -0.184]	[-0.563; -0.165]
Burnout -> Stress	0.890	11.480	<0.001	[0.740; 1.038]	[0.726; 1.027]
Stress -> Resilience	-0.225	2.141	0.033	[-0.442; -0.032]	[-0.425; -0.008]
Gender x Burnout-> Stress	-0.257	2.304	0.021	[-0.463; -0.020]	[-0.476; -0.041]
Indirect effects					
Burnout -> Stress -> Resilience	-0.200	2.161	0.031	[-0.386; -0.029]	[-0.374; -0.008]

CI- Confidence Interval

DISCUSSION

We found no significant difference in stress and burnout between Vietnamese male and female healthcare professionals during the COVID-19 epidemic. It differs from numerous prior works. Women are more psychologically from the COVID-19 pandemic.⁵⁷ An article found female healthcare workers were more at risk than male workers, consistent with pre-COVID-19 studies on post-traumatic stress symptoms.⁵⁸

Next, the data showed that single healthcare workers

experienced considerably higher stress and burnout than married workers, which is consistent with many previous studies. SARS-era single healthcare workers had a higher incidence of stress problems than married workers, according to several studies.^{59,60} Before the pandemic, Chen et al. (2022) found that single, divorced, and unmarried people experienced higher burnout than married people.⁶¹

Gama, Barbosa, and Vieira (2014) and Kiekkas et al. (2010) found that singles are more burnt out.^{62,63} Married healthcare professionals had higher stress, trait anxiety, and burnout than those caring for

COVID-19 patients.⁶⁴ Other studies have shown no link between marital status and occupational burnout.^{65,66}

Our results showed no significant resilience difference between single and married personnel, which is consistent with Afshari et al. (2021) and Di Trani et al. (2021).^{67,68} They also believed that their prior studies on healthcare workers' resilience found no statistically significant variation in resilience scores by marital status.^{67,68} Liu et al. (2022) found that married healthcare workers had higher social support scores than unmarried workers.⁶⁹

We found considerable stress differences among hospital types. Other studies revealed that public hospital workers reported more stress and burnout than private, training, and university hospital staff.¹⁸

Torrente et al. (2021) found that healthcare workers on the front lines of the COVID-19 pandemic (many of whom work in field hospitals) had twice the risk of burnout syndrome.⁷⁰ However, our study found no difference in healthcare worker burnout among workplaces. The unusual scenario in Vietnam during the pandemic may have contributed to overcrowding in field hospitals, national hospitals, and private medical institutions. The epidemic in Vietnam may have been exceptional because field hospitals and government hospitals were overcrowded as patient numbers increased.

The results of our study indicate that there was no discernible difference in the levels of resilience and social support perceived by healthcare workers across different work environments. Although previous studies have suggested that healthcare personnel in public hospitals exhibit greater resilience compared to those in private hospitals,^{71,72} our investigation did not uncover any research that either confirms or contradicts this finding. The resilience and social support for COVID-19 healthcare staff may not be influenced by the type of medical facility. Nevertheless, the impact of the environment and society on human resilience is still significant.^{73,74} Therefore, it is imperative to conduct additional research on this subject.

Another statistically significant variation in stress distribution features by family size was discovered in this study. This study confirms earlier findings. Among 6,293 participants aged 19 and older, Noh et al. (2017) found that family members enhanced anxiety.⁷⁵ Compared to those living alone, more unmarried women lived in two-, three-, or four-person homes.⁷⁵ The UK and Finnish study by Lahelma and colleagues (2002) found that women living in families with both parents and children had better mental health than women living alone or in other types of families.⁷⁶ Healthcare professionals with children had higher mean stress, anxiety, and quality of life scores than those without.⁷ Afshari et al. (2021) found that nurses without children were more resilient.⁷⁵ One reason was concern about family and self-infection, and protective equipment discomfort may

have contributed to psychological stress.⁷⁷ Zhu et al. (2020) found that living with a family and worrying about oneself and one's family contracting the disease contributed to anxiety and stress in medical personnel.⁷⁸

Robertson et al. (2016) have investigated the social elements that contribute to the development of resilience,⁷⁹ our study discovered no indication of variations in the resilience capacity and social support resources of healthcare personnel based on their family size. According to Marey-Sarwan et al. (2022), hospital staff and nurses attributed their ability to cope with the COVID-19 epidemic to family support.⁸⁰ Ugwu et al. (2019) also showed that large families reduce tiredness and promote recuperation.⁸¹ This suggests greater research on using family resources to help healthcare staff cope with long-term crises, stress, and burnout.

We found significant disparities in stress and burnout depending on how frequently people came home during the day. Somboonviboon et al. (2023) observed that greater workloads and fewer days off per week increase the likelihood of burnout syndrome, which might make people dislike their jobs.⁸² In particular, the more hours an employee works each week, the more recipients they interact with and the bigger their caseload, resulting in more weariness.⁸³

Stress and COVID-19 burnout are linked in this study. Previous research showed that stress reduces burnout,⁷ The study also found that severe and high stress almost quadruples burnout risk.²⁸ However, our research found that healthcare workers with higher burnout levels had higher stress levels, which is distinct.

Our data demonstrated no significant difference between male and female healthcare professionals in stress and burnout during the COVID-19 pandemic, while the PLS results suggested a mild gender effect. Burnout negatively affected stress, especially with gender. Female burnout healthcare workers had less stress than male workers. We have discovered no empirical evidence to support this result, but gender still predicts stress and professional burnout in the health industry. Therefore, the next studies must focus on that element to utilize the specific characteristics of mental health problems among health workers and improve medical services in Vietnam.

We observed that psychological resilience negatively and significantly affected stress and burnout, as expected. Resilience increased with decreasing stress and burnout. In contrast, highly resilient healthcare workers may have adequate coping resources with positive emotions and can effectively address COVID-19-related stressors and endure the psychological burden of the pandemic, reducing psychological distress (e.g., anxiety, depression, insomnia, and fatigue).⁸⁴ Serrão et al. (2021) also linked burnout to psychological resilience.²³ During the COVID-19 pandemic, Serbian healthcare professionals' resilience was negatively correlated with burnout, favorably

correlated with subjective well-being, and reduced the negative correlation.⁸⁵

Current research difficulties like stress, burnout, and mental health issues may become complex during and after the COVID-19 pandemic. This subject will continue to impact individuals, groups, and society. Studying the relationship between stress, burnout, resilience, and social support has major implications for decision-making and strategy development in many fields, including research, mental health care, counseling, psychotherapy, human resource management, and work quality during and after the COVID-19 pandemic. Understanding how mental resilience and social support affect stress and burnout might help mental health providers identify at-risk patients. Understanding how these psychological processes interact might help mental health providers design coping and emotion adjustment therapies. Evaluating emotional resilience and social support helps clinicians use their resources and assistance for emotional support and load sharing in their daily lives and work. From then, therapy outcomes are understood. Our research also illuminated clinic and hospital human resource management departments. Human resource managers in the health sector can create plans and policies to avoid and reduce occupational stress and burnout in medical institutions. Health facilities also activate and improve protective variables including the working environment and working time policies for healthcare workers during the COVID-19 pandemic. Research on stress and burnout under the effect of mental resilience and social support in healthcare workers can reveal the causes of these issues. The results imply that social support does not regulate or mediate other model elements, but they provide practical evidence for the link between these variables in the social distance stage during COVID-19.

We also found that demographics and working conditions including marital status, frequency of return home, and family size significantly affect stress, resilience, and burnout. This could help researchers better understand the complex psychological factors causing healthcare workers' psychiatric health issues and find a multilevel model that accounts for protective factors, support systems, and responsibilities. To improve our knowledge, we should include the work environment as well as gender, age, and qualifications. Researchers can develop theoretical or practical methods to test mental health issues like stress and burnout and advise psychotherapists on how to help their clients manage their emotions and behaviors by studying how mental resilience and social support affect the relationship between stress and burnout. This can minimize stress and weariness in healthcare workers' personal and professional lives and promote recovery and mental health.

The current study was localized; hence its findings are not generalizable. In Vietnam, epidemic situations and disease response strategies vary by locality, so a study with more participants from more re-

gions would be interesting to examine the interactions between stress, burnout, mental resilience, and social support and their differences in other localities. Our research shows that social support does not interact with the other model variables. This illustrates the insufficient social assistance for employees during the isolation phase to avoid and contain the COVID-19 epidemic in Vietnam. However, the questionnaires' limited data may miss health workers' social support. Future studies using in-depth interviews, photovoice's, etc. should illuminate the pandemic's effects on healthcare personnel. Despite these limitations, our work has research implications for theoretical burnout prevention measures.

CONCLUSION

The COVID-19 epidemic has impacted all aspects of individuals' lives, including their psychological well-being. The demanding nature of healthcare professions often leads to the prevalence of common mental health conditions such as stress, burnout, and anxiety among practitioners in this field. This study examines the correlation between stress, burnout, resilience, and social support among healthcare workers during the COVID-19 pandemic, considering the prevailing pattern. The primary discovery of the study is that a resilient pattern serves as a mediator in the relationship between stress and burnout, whereas gender-related characteristics operate as moderators in the relationship between stress and mental resilience. However, social support was taken into account, but there was no engagement with other variables. Moreover, the study also revealed variations in stress, burnout, resilience, and social support based on demographic and professional factors. Although our study has some limitations, it has enhanced our understanding of mental health issues among healthcare workers. It has also facilitated the identification of a complex pattern that takes into account both harmful factors and protective factors, as well as the support systems available in mental healthcare for healthcare workers. This study aims to provide comprehensive and valuable insights into this topic in the future.

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