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Article

The effect of post-COVID-19 pandemic on the mental health of Vietnamese populations: A cross-sectional study

Hong-Quan Bui[1], Thien-Vu Giang[2,*], Thanh-Ngan Pham-Ngoc[2], Vi-Dieu Vu-Thi[2]

[1] Early Childhood Education Department, Ho Chi Minh City University of Education, Ho Chi Minh City 700000, Vietnam
[2] Psychology Department, Ho Chi Minh City University of Education, Ho Chi Minh City 700000, Vietnam
*** Corresponding author:** Thien-Vu Giang, vugt@hcmue.edu.vn

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Abstract: COVID-19 is among the tremendous negative pandemics that have been recorded in human history. The study was conducted to give a breakdown of the effect of post-COVID-19 mental health among individuals residing in a developing country. The two scales, namely DASS-21 and IES-R, were employed to collect the essential related data. The findings indicated that anxiety was a typical and common mental issue among the population, including up to 56.75% of the participants having extremely severe anxiety, 13.18% reporting severe anxiety. Notably, no one has anxiety and depression under moderate levels. Additionally, there is 51.92% depression and 43.64% stress ranging from severe to extremely severe levels. Furthermore, there were significant statistical differences among the data on stress, anxiety, and depression according to gender (males and females) and subgroups (students, the elderly, and medical healthcare workers). Besides, the prevalence of post-traumatic stress disorder in the study was relatively high, especially when compared to the figures reported by the World Health Organization. Moreover, stress, anxiety, and depression all displayed positive correlations with post-traumatic stress disorder. This is big data on the mental health of the entire population that helps the country's government propose policy strategies to support, medical care and social security for the population.

Keywords: mental health; post-COVID-19; stress; anxiety; depression; Vietnam

1. Introduction

COVID-19 has increased mental health problems globally, with the prevalence of anxiety and depression rising to 25% according to a report of the WHO (2022). Furthermore, evidence states the rising prevalence of various mental health issues, embracing emotional disorders, sleep disorders, depressive disorders, anxiety disorders, post-traumatic stress disorder (PTSD), panic disorder, alcohol use disorders, compulsive hand washing (a specific symptom of obsessive-compulsive disorders), avoiding crowded areas, domestic violence, child abuse, substance abuse (Brooks et al., 2020; Galea et al., 2020; Kathirvel, 2020). Worse, although the pandemic has been under control recently, the grief and loss relative to COVID-19 still might unpredictably and abruptly cause a decline in mental health quality (Grace, 2021; Stroebe et al., 2007; Umberson and Chen, 1994; Wakam et al., 2020), with several prognoses indicating a long-term impact from 1 to 3 years after COVID-19 (Carmassi et al., 2022; Giannopoulou et al., 2021; Preti et al., 2020; Zacher et al., 2023).

COVID-19 has severe repercussions for the mental health of individuals globally including Vietnamese, especially Ho Chi Minh City. Generally, in Vietnam, there were high prevalences of PTSD, anxiety, and depression reported among 1544 COVID-19 patients being isolated or cured in field hospitals (Nguyen et al., 2023).

Similar figures were also observed in the case of healthcare workers, 49.9%, 52.3%, and 29.8% of whom reported having depression, anxiety, and stress during the COVID-19 pandemic (Nguyen et al., 2024). The COVID-19 vulnerability was also detected at the household level, to which low educational attainment of household heads, low engagement in stable jobs, and limited access to support from local government, grassroots organizations, and groups were evident to contribute (Huynh and Bui, 2024).

Additionally, regarding the statistics of Son et al. (2022), until 18 July, there were 10,758,189 coronavirus cases and 43,090 deaths, 19,984 of which were reported in Ho Chi Minh City specifically. Similarly, several common mental health issues were also stated among COVID-19 patients after recovery in Ho Chi Minh City, including anxiety-related and stress-related disorders (panic disorder, generalized anxiety disorder, obsessive-compulsive disorder, post-traumatic stress disorder), depressive disorders, chronic fatigue syndrome, brain fog, cognitive impairment (Son et al., 2022).

In the face of the COVID-19 pandemic, the Vietnamese government specifically and its people generally have put a great effort in confronting the deteriorating impact of the pandemic. Therefore, the Vietnamese government has enacted a range of COVID-19-related directives in the hope of drawing the attention and collaboration of the Vietnamese people in coping with the pandemic. Among those, three notable directives were of paramount importance, embracing 15, 16, and 19 directives, which stated the guidelines and measures for the Vietnamese to obey and implement for better adaptation to the ever-changing demands of the pandemic. Therefore, with the spirit of "fighting the pandemic is like fighting an enemy", the Vietnamese people obediently followed strict lockdown and social distancing, accompanied by several restrictions in social activities, with the restricted levels varying along with the serious and severe degrees of the pandemic. In other words, both the Vietnamese government and its residents simultaneously reached a consensus of emphasizing the importance of human well-being over economic benefits, which was in stark contrast to the pandemic prevention stated in several countries (Cục Y tế dự phòng, Bộ Y tế, 2020a, 2020b, 2020c).

Ho Chi Minh City is deemed one of the key contributors to Vietnam's economy. Nevertheless, the economic contribution of its residents is at risk of degradation due to the undesirable harmful impact of COVID-19. However, from the time marked by the end of the global pandemic declared by WHO/2022 onwards, the context of citizens' post-COVID-19 mental health in Ho Chi Minh City has not been described comprehensively. To solve this problem, from 06/2023 to 12/2023, the research conducting the screening and assessment process of stress, anxiety, depression, and PTSD over 7852 objects at Ho Chi Minh City to clarify the context of post-COVID-19 mental health of citizens in Ho Chi Minh City, Vietnam.

2. Literature review

During COVID-19, changes occurring due to the outbreak of the pandemic have left various challenges to mental health in almost all nations. The evidence shows that global recession, prolonged social distancing (Kato et al., 2020), and financial

instability (Ganesan et al., 2021) are considered some of the major concerns exacerbating mental health problems. Simultaneously, unemployment (Panchal et al., 2021), disruptions in finance and comestibles (Abdalla et al., 2023), psychosocial impacts (Tudor et al., 2023; Zhu et al., 2022), mental health issues recurrence (Young et al., 2023), perceived loneliness, grief and loss, lack social connections, distress in loneliness (Etienne, 2023; Galea et al., 2020; World Health Organization, 2022) are implicit risks of declining mental health. Frequently, according to the findings of those studies, the consequences, in turn, took a heavy toll on the possible mental disorders among the population.

Difficulties in mental disorders interventions related to distancing and disruptions in offering mental health services in the context of social distancing make pre-existing mental health problems become exacerbated, increasing the risk and spread of numerous mental disorders (World Health Organization, 2022). Therefore, there were several prevalent COVID-19 mental health issues, including depression, anxiety, psychological distress, PTSD, suicidal ideations, suicide attempts, and behavioral disorders, to name a few (da Cunha Varella, et al., 2024; Dewhurst et al., 2024; Lueck et al., 2024; Patel et al., 2022; Zhu et al., 2023).

Similarly, effort was put to clarify the possible impact of COVID-19 on Vietnamese people's mental health. It was evident that the prevalence of sleep disorders and abuse was high among Vietnamese. Furthermore, there was also a distress level recorded among the populace, with the figure for females higher than males, commonly implying the feeling of ambiguity about the purpose of life (Duong et al., 2023). Moreover, according to one of a few studies delving into common mental health issues among patients used to be diagnosed with COVID-19 in Thai Binh Province, a Northern part of Vietnam, the research's findings stated that over 90% of its population had normal levels of stress, anxiety, and depression, with only 4.3%, 6.1%, and 7.3% of the participants displaying mild to moderate levels of depression, anxiety, and stress, respectively (Thang et al., 2024). Another Vietnamese study also focuses on the mental health status of patients after the COVID-19 recovery, with an emphasis on depression, anxiety, and stress. The findings stated that, in a particular Tan Phu district, Ho Chi Minh City, there were 5.3%, 3.2%, and 24.6% of the participants reported stress, depression, and anxiety. Besides, this study also stated age, marital situation, living with family, COVID-19 severity, and maintaining exercise as related factors affecting the three mentioned mental health issues (Thu et al., 2024).

From the aforementioned information, globally, studies related to COVID-19 mental health are relatively diverse. On the contrary, in Vietnam, although several studies are reporting post-COVID-19 depression, anxiety, and stress, the recorded data still relies on narrowed research samples, resulting in a lack of representativeness. Simultaneously, those findings have yet to be examined thoroughly, with data only focusing on the presence of mental health issues, but not delving into their levels of categorization. Therefore, it remains a mystery in research emphasizing the mental health issues in Ho Chi Minh City, a part of Southern Vietnam, which is deemed among the vibrant and paramount metropolis nationally.

3. Materials and methods

3.1. Study design

The study aimed to examine the post-COVID-19 mental health of Vietnamese populations after the pandemic was controlled. The area we chose as a representative sample for the entire population is the area most heavily affected in terms of economics, finance, politics, education, culture, health, and social security in Vietnam: Ho Chi Minh City. We launched the survey for this cross-sectional study from February 2023 to October 2023. We designed and conducted the survey using the DASS-21 (for screening the levels of stress, anxiety, and depression) and IES-R (for assessing the levels of PTSD). The Ethics Committee under the People's Committee, Ho Chi Minh City Department of Science and Technology, and Ho Chi Minh City Department of Education and Training approved this study.

3.2. Study population and sample

The study population was residents living across districts in Ho Chi Minh City. Participant recruitment and data collection took place between October 2023 and January 2024. We sent an official email to the People's Committee of each district under Ho Chi Minh City to invite them to assist the research team in contacting people and collecting data. After receiving approval from the district-level People's Committee to participate in the study, local government staff will assist the research team in calling people in the demographic area managed by the regional police to come to the committee office to voluntarily participate in this survey. At the office, surveys were sent to the participants with full of the project's information and consent to participate in the current study. Participants were informed about the study via an information sheet, which was attached to every single questionnaire. The information sheet provided details about the study aims, questionnaire, confidentiality, choice of participation, withdrawal, and the researchers' contact. Completing the survey would confirm the consent to participate in the study. Only fully completed surveys were included in the final analysis. To diversify the ways to help people complete the survey, the research team devised and conducted a website https://suckhoetinhthan.hcmue.edu.vn/ to screen and evaluate the mental health statuses of Ho Chi Minh City citizens based on the established theoretical framework.

According to the Population and Family Planning Sub-department, the number of individuals residing in Ho Chi Minh City was 8,899,866 in 2023 (Population and Family Planning Sub-department, 2023). The sample size was determined via Cochran's sample size formula for finite population (1977), with the minimum sample size being 384 subjects. Therefore, according to Cochran's perspectives, the sample size of 384 subjects was the minimal standard to be perceived as representative of Ho Chi Minh City's population. A total of 7258 residents took part in the survey. **Table 1** describes the demographic information of the research population. The research participants were separated into three groups, who were vulnerable to mental disorders: the elderly (above 60 years old), students (under 18 years old), and medical healthcare workers. Simultaneously, the number of elderly was 427 (5.4%), while the figures for students and medical health workers were 1092 (13.9%) and 6333 (80.7%),

respectively. Additionally, regarding gender, there were 5417 responses (69%) from female participants, whereas only 2435 respondents (31%) were male.

Table 1. Demographic information of the study population.

Characteristics		**Number**	**Percentage**
Population samples who were severely affected by the COVID-19	The elderly	427	5.4%
	Student	1092	13.9%
	Medical healthcare workers	6333	80.7%
Gender	Male	2435	31%
	Female	5417	69%
Total		7852	100%

Simultaneously, based on the reality, Ho Chi Minh City was a key economic center of Vietnam, with most categories, services, and enterprises mainly located here. However, COVID-19 almost hindered all commercial activities in this city, leading to the unemployment of thousands of individuals (Ministry of Planning and Investment—General Statistics Office, 2021). Social distancing also resulted in situations where the fundamental needs of residents failed to be met. Those factors could predict the deterioration in post-COVID-19 mental health among this population. A range of studies stated that the disruption in employment, security, economy, and the insufficiency of products exacerbated the burden on mental disorders (Abdalla et al., 2023), social isolation, and perceived loneliness derived from social distancing (Bierman and Schieman, 2020), material difficulties due to unexpected global recession (Bierman et al., 2021; Donnelly and Farina, 2021), all of which were risk factors negatively impacting the mental health.

Furthermore, according to statistics from the Ho Chi Minh City Center for Disease Control (2022), there were 618.275 coronavirus cases and 19.984 deaths due to COVID-19 (from 04/2021 to 12/2022). This meant that despite the economic issues or human problems, Ho Chi Minh City was the region heavily deteriorated by COVID-19. Additionally, according to Vadivel et al. (2021), the elderly, adolescents, medical health professionals, and females were special groups more vulnerable to mental disorders due to the impacts of COVID-19 than other social groups. Therefore, this study concentrated on clarifying the mental health of the Ho Chi Minh City population sharing similar demographic characteristics to explore the existing mental health issues in this area post-COVID-19.

3.3. Study procedure and data analysis

- Step 1: Screening potential risks

DASS-21 (Depression, Anxiety, Stress Scale-21-Vietnamese version) was employed, including items addressing the levels of stress, anxiety, and depression of research subjects. During the survey process, the participants answered questions about their mental health within the past 7 days. The questions were evaluated by the Likert 4, ranging from 0 (“Did not apply to me at all”) to 3 (“Applied to me very much or most of the time”). The total score of each domain was classified into 2 categories (see **Table 2**), namely “no risk,” whose scores were interpreted in the normal or mild

levels, or "potential risk" for mental disorders associated with stress, anxiety, and depression, whose scores ranged from moderate levels to extremely severe levels. These categories were established via the discussion process of two clinical psychologists engaging in the screening procedure.

Table 2. Cut-off scores for stress, anxiety, and depression according to DASS-21.

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

- Step 2: Assessing symptoms

Numerous studies deem PTSD as one of the most common post-COVID-19 mental disorders (World Health Organization, 2022; Zacher et al., 2023). Furthermore, anxiety and depression were perceived to be among the potential risks causing PTSD post-COVID-19 (Carmassi et al., 2022; Giannopoulou et al., 2021). Besides, excessive and prolonged stress exposure raised the risk of various mental health symptoms, potentially leading to PTSD (Al Jowf et al., 2022). Hence, the research team conducted the assessment process which addressed PTSD symptom levels of the population classified into the "potential risk" team, whose scores in stress, anxiety, and/or depression were categorized from "moderate" to "extremely severe" levels in the previous screening process. Therefore, this assessment process was conducted to delve deeper into the context of the mental health of citizens residing in Ho Chi Minh City (see **Table 3**).

The research data collected above was analyzed by SPSS 22.0.

Table 3. Cut-off scores for PTSD according to IES-R.

	PTSD
No PTSD	<24
Subthreshold PTSD	24–32
PTSD	33–36
Severe PTSD	⩾37

4. Results

4.1. Screening potential risks

4.1.1. The context of stress, anxiety, and depression

Concerning screening findings, there were high potential risks of the Ho Chi Minh City population encountering mental health disorders related to stress, anxiety, and depression. This context is detailed in **Table 4**.

Table 4. The context of stress, anxiety, and depression of the participated population.

Mental health aspect			**Samples (*N* = 7852)**	**The elderly (*n* = 427)**	**Students (*n* = 1092)**	**Medical workers (*n* = 6333)**
Stress	Normal	*n*	2080	102	161	1817
		%	26.49	23.89	14.74	28.69
	Mild	*n*	925	58	289	578
		%	11.78	13.58	26.47	9.13
	Moderate	*n*	1420	125	238	1057
		%	18.08	29.27	21.79	16.69
	Severe	*n*	2743	113	381	2249
		%	34.93	26.46	34.89	35.51
	Extremely severe	*n*	684	29	23	632
		%	8.71	6.79	2.11	9.98
Anxiety	Normal	*n*	0	0	0	0
		%	0.00	0.00	0.00	0.00
	Mild	*n*	0	0	0	0
		%	0.00	0.00	0.00	0.00
	Moderate	*n*	2361	92	335	1933
		%	30.07	21.55	30.68	30.52
	Severe	*n*	1035	86	173	777
		%	13.18	20.14	15.84	12.27
	Extremely severe	*n*	4456	249	584	3623
		%	56.75	58.31	53.48	57.21
Depression	Normal	*n*	0	0	0	0
		%	0.00	0.00	0.00	0.00
	Mild	*n*	0	0	0	0
		%	0.00	0.00	0.00	0.00
	Moderate	*n*	3775	194	559	3022
		%	48.08	45.43	51.19	47.72
	Severe	*n*	1601	129	318	1154
		%	20.39	30.21	29.12	18.22
	Extremely severe	*n*	2476	104	215	2157
		%	31.53	24.36	19.69	34.06

Regarding stress, the data indicated that there were only 26.49% of the population reported a moderate level of stress, and 11.78% belonging to a mild level. Those individuals reflected no risk of developing stress-related mental disorders, which potentially induced distress, helplessness, and dysfunction. However, it was noteworthy that there were 61.72% of the total participants (the sum of 18.08%, 34.93%, and 8.71%) in the group reported potential risks for stress-related mental disorders. Among those, up to 34.93% of individuals were at high potential risks (severe stress) and 8.71% of the population were at very high potential risks (extremely severe stress). Considering anxiety, there were no respondents categorized in the "no risk" group (normal anxiety = mild anxiety = 0%). Meanwhile, 30.07% of the total participants were classified into the "potential risk" group of anxiety-related

mental disorders, with 13.18% being at high potential risks (severe anxiety), but 56.75% being at very high potential risks (extremely severe anxiety). With depression, screening data demonstrated that all the participants were prone to mental disorders associated with depressive symptoms (normal depression = mild depression = 0%). There was a slight difference in the analyzed data on anxiety and depression. Throughout the sample, the proportion of individuals reporting moderate depression was 48.08% (a "potential risk" group), while the sum of those with severe and extremely severe depression was 51.92%, with 20.39% and 31.53%, respectively (high to very high potential risks). The sum of data on severe and extremely severe depression levels (the total participants in the groups of high and very high potential risks) was less than that of participants with extremely severe anxiety levels (very high potential risks; 51.92% < 56.75%).

According to data differences between subgroups of subjects, the elderly depicted higher percentages of severe and extremely severe anxiety than the two remaining groups (78.45% > 69.48% > 69.32%). Additionally, the proportion of depression among the elderly was also highest (54.57% > 52.28% > 48.81%). These analyses emphasized the distinction compared to findings reported in other previous studies. Therefore, in this study, the elderly were a group displaying greater vulnerability to anxiety and depression than medical workers in Ho Chi Minh City, even though medical workers were those directly impacted by COVID-19. However, the current mental health of medical workers remains a conundrum to be addressed, especially in Ho Chi Minh City. It was evident that medical healthcare workers reported significantly worse anxiety and depression levels than stress, with 69.48% of medical health workers having severe or extremely severe anxiety (the sum of 57.21% and 12.27%), and 52.28% having severe or extremely severe depression (the sum of 18.22% and 34.06%). Furthermore, it was noteworthy that there was no respondent reporting anxiety or depression at normal or mild levels. Besides, while the total percentage of severe and extremely severe depression in students was less than that of the other two subgroups, the figure for severe and extreme anxiety in students was approximately that of medical healthcare workers (69.32% ~ 69.48%)

In general, screening findings pointed out that anxiety was the most common post-COVID-19 mental health difficulty among the population in Ho Chi Minh City (56.75% > 31.53% > 8.71%). There were 4456/7852 subjects (56.75%) having anxiety at an extremely severe level. Meanwhile, the figure for depression was nearly half that of anxiety, at 31.53% (2746/7852 participants). Finally, the extremely severe stress accounted for 8.71% (684/7852 participants). Conclusively, although anxiety stood out with the highest prevalence across Ho Chi Minh City, depression was reported in 100% of participants categorized into the "potential risk" group, with depression scores ranging from moderate to extremely severe levels.

4.1.2. Comparison between stress, anxiety, and depression according to demographic characteristics

Regarding the screening data, it was apparent that there were differences existing in the context of stress, anxiety, and depression between subgroups. The evidence supporting this interpretation was provided in the following **Tables 5** and **6**:

Table 5. Comparing levels of depression, anxiety, and stress between subgroups.

	Subgroups	**Mean**	**Standard deviation**	***F*-values**	***p***
Depression	The elderly	22.501	7.1155	16.482	0.000
	Students	21.167	6.4569		
	Medical healthcare workers	22.644	8.1176		
Anxiety	The elderly	22.590	7.1699	8.931	0.000
	Students	21.410	6.5381		
	Medical healthcare workers	22.466	7.9614		
Stress	The elderly	22.361	7.1556	9.543	0.000
	Students	22.132	6.1611		
	Medical healthcare workers	23.155	8.0152		

Table 6. Comparing levels of depression, anxiety, and stress according to gender.

	Gender	**Mean**	**Standard deviation**	***p***
Depression	Male	22.640	8.0754	0.015
	Female	22.336	7.7756	
Anxiety	Male	22.549	7.9861	0.001
	Female	22.225	7.6329	
Stress	Male	23.201	7.9226	0.032
	Female	22.866	7.6649	

ANOVA test was conducted to explore the possible differences between the elderly, students, and medical healthcare workers in depression, anxiety, and stress. The data indicated that, across three subgroups, the levels of stress, anxiety, and depression were moderate, extremely severe, and severe, respectively. However, there were still differences regarding the mean of each subgroup in each domain ($p = 0.000 < 0.01$). The indicators clarified that the elderly displayed a higher tendency to anxiety than medical healthcare workers (Mean = 22.590 > Mean = 22.466). Nevertheless, medical healthcare workers reported higher depression than the elderly (Mean = 22.644 > Mean = 22.501). Furthermore, students were less likely to be diagnosed with anxiety and depression than the two remaining groups. Therefore, although the elderly were vulnerable to anxiety, the impact of depression on medical healthcare workers' mental health was more extreme.

Similar to the percentages reported in **Table 4**, the findings in the Anova test stated that anxiety symptoms associated with depression were currently typical mental health issues among the population in Ho Chi Minh City. Meanwhile, the elderly had the highest likelihood of being diagnosed with related mental health disorders, followed by medical healthcare workers, and eventually students. This meant that the initial assumptions about the differences in stress, anxiety, and depression between the three subgroups were rational.

Table 6 gives a breakdown of stress, anxiety, and depression statistics between males and females. The data showed that both males and females had moderate levels of stress, extremely severe levels of anxiety, and severe levels of depression. However, there were existing differences when comparing the means between the two

subgroups. The results described astonishing findings that the degrees of stress, anxiety, and depression in males were higher than females, with the means of depression, anxiety, and stress being 22.649 > 22.336, 22.549 > 22.225, 23.201 > 22.866, respectively. Although the distinguishes were not significant, the findings discovered novel characteristics compared to other findings published in previous studies. Therefore, it could be assumed that the degrees of stress, anxiety, and depression were different in different eras. Additionally, stress, anxiety, and depression were reported differences regarding several demographic factors. Simultaneously, anxiety and depression were proven to be two typical issues for the downgrade of mental health among the population in Ho Chi Minh City.

4.2. The context of PTSD among the participating populations

4.2.1. The levels of PTSD

The screening results indicated that among 7852 participants, they might report at least one in three mental health issues, embracing stress, anxiety, and depression from moderate levels or above. Therefore, all participants were requested to engage in the assessment of PTSD.

Table 7 demonstrates the levels of PTSD among the population in Ho Chi Minh City. The findings pointed out that up to 76% of participants (5696/7852 subjects) have completely no symptoms of PTSD. Meanwhile, 4.1% of participants had one or several clinical symptoms of PTSD (subthreshold PTSD), with 321 individuals out of the total of 7852. Furthermore, there were only 1.9% of individuals (146/7852) whose expressions were valid to be assessed as having PTSD. Nevertheless, it was noteworthy that around 18% of the population (1416/7852) had PTSD at a severe level. These figures stated that COVID-19 had a negative repercussion on the population's mental health across Ho Chi Minh City, with nearly 24% of individuals reaching the threshold of PTSD (the sum of 4.1%, 1.9%, and 18%). This meant that with every 8 people in Ho Chi Minh City, 2 people could be diagnosed with PTSD. Furthermore, it was alarming that the shares depicting those having PTSD and severe PTSD were way higher than those with subthreshold PTSD (1.9% < 15.7%, 2.6% < 12.9%, 1.7% < 19.1%).

Table 7. The context of PTSD among the population in Ho Chi Minh City.

Levels			**Samples (*N* = 7852)**	**The elderly (*n* = 427)**	**Students (*n* = 1092)**	**Medical workers (*n* = 6333)**
PTSD	No PTSD	*n*	5969	327	856	4786
		%	76.0	76.6	78.4	75.6
	1 or several symptoms	*n*	321	25	67	229
		%	4.1	5.9	6.1	3.6
	Having PTSD	*n*	146	8	28	110
		%	1.9	1.9	2.6	1.7
	Having PTSD at severe level	*n*	1416	67	141	1208
		%	18.0	15.7	12.9	19.1

Considering the PTSD data on the elderly, students, and medical healthcare workers, the proportion of severe PTSD was lowest among students (12.9%), followed

by the elderly (15.7%), eventually the medical health workers being by far the highest (19.1%). Therefore, with each 5 medical healthcare workers residing in Ho Chi Minh City, there would be 1 person diagnosed with severe PTSD. Hence, medical health workers and the elderly were two populations more prone to PTSD symptoms than the student population.

4.2.2. The relationships between stress, anxiety, depression, and PTSD

It was obvious that there were 1883 individuals across the city displaying PTSD symptoms characterized by various levels.

Table 8 describes the relationships between stress, anxiety, depression, and PTSD among medical healthcare workers in Ho Chi Minh City. The results pointed out that stress was positively moderately correlated with PTSD, with a correlation coefficient being 0.38 ($p < 0.01$). In other words, when stress levels rose, levels of PTSD also simultaneously grew, with the reverse being true as well. Therefore, the higher levels of stress medical health workers reported, the more vulnerable they were to PTSD, and vice versa.

Table 8. Correlations between stress, anxiety, depression, and PTSD among medical healthcare workers.

Pearson correlation	Stress	Anxiety	Depression
PTSD	0.38**	0.382**	0.402**

Simultaneously, there was a positive moderate correlation between anxiety and PTSD among medical healthcare workers, with a correlation coefficient being 0.382 ($p < 0.01$). This meant that once the anxiety levels climbed up, PTSD levels also increased, with the reverse being true as well. Hence, the higher levels of anxiety medical health workers reported, the more vulnerable they were to PTSD, and vice versa.

Additionally, the data implied that depression was positively moderately correlated with PTSD, with a correlation coefficient being 0.402 ($p < 0.01$). The results indicated that when depression levels rose, PTSD levels simultaneously climbed up as well, with the reverse also being true. Therefore, the higher levels of depression medical health workers reported, the more vulnerable they were to PTSD, and vice versa. Moreover, depression was a factor reporting a correlation coefficient higher than those of the two remaining factors ($r = 0.402^{**} > r = 0.382^{**} > r = 0.38^{**}$). This could be implied as medical healthcare workers were more prone to depression symptoms. Therefore, depression had a close association with PTSD among medical health workers in Ho Chi Minh City.

Table 9. Correlations between stress, anxiety, depression, and PTSD among the elderly.

Pearson correlation	Stress	Anxiety	Depression
PTSD	0.439**	0.458**	0.46**

Table 9 illustrates the relationships between stress, anxiety, depression, and PTSD among the elderly in Ho Chi Minh City. The results pointed out that stress was

positively strongly correlated with PTSD, with a correlation coefficient being 0.439 ($p < 0.01$). In other words, when stress levels rose, levels of PTSD also simultaneously grew, with the reverse being true as well. Therefore, the higher levels of stress the elderly reported, the more vulnerable they were to PTSD, and vice versa.

Simultaneously, there was a positive strong correlation between anxiety and PTSD among the elderly, with a correlation coefficient being 0.458 ($p < 0.01$). This meant that once the anxiety levels climbed up, PTSD levels also increased, with the reverse being true as well. Hence, the higher levels of anxiety the elderly reported, the more vulnerable they were to PTSD, and vice versa.

Moreover, the data implied that depression was positively strongly correlated with PTSD among the elderly, with a correlation coefficient being 0.46 ($p < 0.01$). The results indicated that when depression levels rose, PTSD levels simultaneously climbed up as well, with the reverse also being true. Therefore, the higher levels of depression the elderly reported, the more vulnerable they were to PTSD, and vice versa.

It was apparent to perceive that the correlations reported among the elderly were way higher than those of medical healthcare workers (Stress: $r = 0.439^{**} > r = 0.38^{**}$; Anxiety: $r = 0.458^{**} > r = 0.382^{**}$; Depression: $r = 0.46^{**} > r = 0.402^{**}$). This implied that in Ho Chi Minh City, the elderly tended to be more vulnerable to the symptoms, to the mental crises, compared to medical health workers in the post-COVID-19 period.

5. Discussion

According to the screening results, anxiety was a typical and common mental issue among the population in Ho Chi Minh City. This finding found a consensus with the previous report of the World Health Organization, which indicated that anxiety and anxiety disorders, substance use disorders (alcohol, cigarette, heroin), obsessive and compulsive hand washing, and self-harm were among common and typical issues in the post-COVID-19 era (Brooks et al., 2020; Galea et al., 2020; Natarajan Kathirvel, 2020; World Health Organization, 2023). Before the declaration of the end of COVID-19 as a global pandemic, a study implied that stressful responses and excessive anxiety also increased in every outbreak period of the pandemic, especially in China, Italia, Poland, Turkey, and America (Nearchou et al., 2020). Besides, the findings of anxiety being the most common mental health issue in this paper were similar to a Columbia study, which stated that besides physical injuries, depression, and anxiety were the most common mental health issues in the post-COVID-19 period, with the percentages being 25.4% and 22.6%, accordingly (Romero et al., 2023). Ho Chi Minh City population was at high risk for mental disorders related to anxiety and depression. This finding was suitable to previous research which concluded that anxiety had a positively strong correlation with depression (Chimbutane et al., 2023). Therefore, the widespread impacts of depression and anxiety across the public could not be remedied after the declaration of the end of the COVID-19 pandemic by the World Health Organization at the end of 2019.

The comparison between subgroups indicated that the elderly reported more severe and extremely severe levels of anxiety than the two remaining subgroups.

While the study of Romero et al. (2023) in Columbia pointed out that depression comprised the vast majority among the elderly and children, this current research with the Ho Chi Minh City population implied that depression was just the second-highest proportion. Instead, severe and extremely severe anxiety tended to be more common across Ho Chi Minh City. Furthermore, the other novel discovery in this study was that the elderly were more prone to anxiety and depression than medical health workers, who were known to experience the direct impact of COVID-19. One previous study stated that the older a person was, the worse impact social distancing had on them. Increasing age could lead to more social responsibilities and social statuses than others (Kudoh et al., 2023). Furthermore, the elderly (above 60 years old) were indicated as a vulnerable population (Vadivel et al., 2021), so retirement might make economic limitations extend. Therefore, family unemployment (Panchal et al., 2021) and disrupted social welfare (Abdalla et al., 2023) due to COVID-19-induced global recession increased the prevalence of mental health issues. Moreover, approaching remote mental healthcare could be a conundrum for the elderly whose psychological resilience, adaptability, and coping ability declined as a result of aging characteristics.

Previous screening reports during the outbreak of the COVID-19 pandemic indicated that the prevalence of anxiety and depression was 60% (Que et al., 2020), with over half of medical health workers being stressed, fatigued, and depressed (Kang et al., 2020). At this time, the percentages of anxiety and depression were way higher than that of stress. There 69.48% of medical health workers display severe and extremely severe anxiety (the sum of 57.21% and 12.27%), and 52.28% have severe and extremely severe depression (the sum of 18.22% and 34.06%). It was clear that the degree of mental health deterioration among medical health workers was not facilitated but exacerbated over time, especially after COVID-19. This analysis was suited to a finding that those working in medical domains displayed worse mental health issues than other professions (Grace, 2021). Therefore, it was rational to conclude that the impacts of COVID-19 on post-COVID-19 mental health did change drastically compared to the prior period. This finding was suitable to the predictions of Preti et al. (2020), which was that the impacts of COVID-19 could be lengthened from 1 to 3 years after the end of the pandemic. According to the COVID-19 experience recorded in Vietnam, the medical health workforce in Ho Chi Minh City engaged and served as the frontline workers, which has left a tremendously negative impact on their mental health thus far. This idea was suited to the analysis presented in **Table 3**. The findings pointed out that with every 5 medical health workers, there would be at least one individual diagnosed with severe PTSD. The ratio of 1/5 was much higher than the prevalence of mental disorders reported by the World Health Organization in 2022, with the ratio being 1/8. A study implied that exposure to serious illnesses, observing the deaths of acquaintances or beloved people, and directly acknowledging the threatening danger of COVID-19 viruses took a heavy toll on the mental health of many frontline medical workers, including doctors, nurses, etc. (Kang et al., 2020). Furthermore, bereavement due to COVID-19 had an exceedingly negative influence on mental health for the following years (Grace, 2021). The death of loved ones due to COVID-19 was associated with the deterioration of mental health (Zacher et al., 2023). Therefore, the worsening of mental health among individuals experiencing grief and loss, especially medical health workers, from the traumatic

events occurring during COVID-19 to the post-COVID-19 period still remained intact. Although COVID-19 has been over for nearly two years, its impacts on mental health remain a traumatic factor that is essential to be investigated and intervened. Conclusively, the group of people tremendously affected by COVID-19 were medical health workers.

Although the percentages of severe and extremely severe anxiety and depression among students were lower than those of the two other subgroups, the figures for anxiety among students were approximate with medical health workers, who were believed to be directly impacted by COVID-19 during the pandemic outbreak (69.32% ~ 69.48%). This was a warning of danger regarding the mental health of students in Ho Chi Minh City. Previously, studies argued that children and adolescents were prone to anxiety, depression, emotional dysregulations, behavioral issues, and psychological distress (including both depressive symptoms and anxiety) during the post-COVID-19 period. Furthermore, the coincidence of the age crisis and adaptive demands to the ever-evolving life attributable to COVID-19 could be a reason underlying the worsening in mental health issues among this population (Nearchou et al., 2020). However, the end of adolescence was perceived as a high-risk period for mental health issues related to post-COVID-19 syndromes (Thomas et al., 2022).

The difference between this study and other prior COVID-19 studies was that males were more vulnerable to stress, anxiety, and depression than females. Meanwhile, numerous previous studies stated that females were more prone to the negative effects of COVID-19 compared to males, or females displayed higher and more symptoms of stress, anxiety, and depression than males (Chimbutane et al., 2023; Romero et al., 2023; Thuy et al., 2023; Thomas et al., 2022; Vadivel et al., 2021; WHO, 2022; Xiong et al., 2020). This finding could become one of the fundamental foundations proving the changes in both quality and quantity of post-COVID-19 mental health. Nevertheless, the differences in culture between Vietnam and Western nations should not be neglected.

Previous studies clarified that PTSD was among the most common mental disorders post-COVID-19 (World Health Organization, 2022; Zacher et al., 2023). Simultaneously, anxiety and depression were deemed as indicators of the risk of developing post-COVID-19 PTSD (Carmassi et al., 2022; Giannopoulou et al., 2021). This meant that the discovery of the correlations between stress, anxiety, depression, and PTSD in this study became suited.

6. Conclusions

The typical mental health issues among the population in Ho Chi Minh City were mental disorders related to anxiety and depression, with no participants reporting normal or mild levels of anxiety and depression. Besides, anxiety and depression among the elderly were worth considering, followed by the figures for medical healthcare workers, and eventually students. Also, although most participants reported no signs of PTSD, the prevalence of PTSD in the current study was noteworthy, especially data recorded among medical healthcare workers. Besides, there were significant statistical differences among stress, anxiety, and depression according to gender and subgroups. Moreover, stress, anxiety, and depression positively correlated

with PTSD. The study indicated that COVID-19 took a heavy toll on both the physical and mental lives of the population in Ho Chi Minh City. However, it remains scarce regarding effective and efficient methods aiming at assisting the Ho Chi Minh City population to cope well with their mental health issues, including supportive psychological services. To foster this process, this research aims to provide scientific foundations for the establishment and enhancement of mental health prevention, interventions, and literacy, whose contents consider anxiety as a central and fundamental issue. Moreover, these approaches can be implemented by numerous methods, such as online or offline, and under the control of public hospitals or private health care. On the other hand, the research findings are scientific foundations for the city's authorities to better formulate the caring policies of public mental health, as well as improve social welfare policies for residents after the COVID-19 pandemic. Depending on the fundamental foundation provided by the current research, future studies could delve into other common mental health issues that have not been mentioned in this study, as well as replicate the study in other regions for a better understanding of the mental health context of Vietnamese people.

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References

Abdalla, S. M., Rosenberg, S. B., Cohen, G. H., et al. (2023). Disruptions to the social determinants of health and mental health indicators during the pandemic in eight countries. SSM—Mental Health, 4, 100249. https://doi.org/10.1016/j.ssmmh.2023.100249

Al Jowf, G. I., Ahmed, Z. T., An, N., et al. (2022). A Public Health Perspective of Post-Traumatic Stress Disorder. International Journal of Environmental Research and Public Health, 19(11), 6474. https://doi.org/10.3390/ijerph19116474

Benke, C., Asselmann, E., Entringer, T. M., et al. (2022). The role of pre-pandemic depression for changes in depression, anxiety, and loneliness during the COVID-19 pandemic: Results from a longitudinal probability sample of adults from Germany. European Psychiatry, 65(1). https://doi.org/10.1192/j.eurpsy.2022.2339

Bierman, A., Schieman, S. (2020). Social Estrangement and Psychological Distress before and during the COVID-19 Pandemic: Patterns of Change in Canadian Workers. Journal of Health and Social Behavior, 61(4), 398–417. https://doi.org/10.1177/0022146520970190

Brooks, S. K., Webster, R. K., Smith, L. E., et al. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. The lancet, 395(10227), 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

Carmassi, C., Tosato, S., Bertelloni, C. A., et al. (2022). PTSD trajectories across different mental disorders in the second year of the COVID-19 pandemic in Italy: a naturalistic, longitudinal, multicenter study. International Review of Psychiatry, 34(7–8), 797–808. https://doi.org/10.1080/09540261.2022.2145184

Chimbutane, F., Herrera-Almanza, C., Karachiwalla, N., et al. (2023). COVID-19 school closures and mental health of adolescent

students: Evidence from rural Mozambique. SSM—Mental Health, 3, 100203. https://doi.org/10.1016/j.ssmmh.2023.100203

Cục Y tế dự phòng, Bộ Y tế. (2020a). Directive no 15/CT-TTg about a drastic implementation in preventing COVID-19 during a peak period. Available online: https://vncdc.gov.vn/chi-thi-so-15ct-ttg-ngay-2732020-cua-thu-tuong-chinh-phu-ve-quyet-liet-thuc-hien-dot-cao-diem-phong-chong-dich-covid-19-mdef1629105793611a2e81741ae.html (accessed on 9 January 2024).

Cục Y tế dự phòng, Bộ Y tế. (2020b). Directive no 16/CT-TTg about implementing imperative solutions to prevent COVID-19. Available online: https://vncdc.gov.vn/chi-thi-so-16ct-ttg-ngay-3132020-cua-thu-tuong-chinh-phu-ve-thuc-hien-cac-bien-phap-cap-bach-phong-chong-dich-covid-19-mdef1629106224611a30307fff8.html (accessed on 9 January 2024).

Cục Y tế dự phòng, Bộ Y tế. (2020c). Directive no 19/CT-TTg about implementing preventing solution to COVID-19 in a new era. Available online: https://vncdc.gov.vn/thu-tuong-chi-thi-tiep-tuc-cac-bien-phap-phong-chong-dich-covid-19-trong-tinh-hinh-moi-nd15509.html (accessed on 9 January 2024).

da Cunha Varella, A. P., Griffin, E., Khashan, A., et al. (2024). Suicide rates before and during the COVID-19 pandemic: a systematic review and meta-analysis. Social Psychiatry and Psychiatric Epidemiology. https://doi.org/10.1007/s00127-024-02617-1

Dewhurst, E., Ettman, C. K., Hare Bork, R., et al. (2023). Symptoms of Posttraumatic Stress During the COVID-19 Pandemic in the Governmental Public Health Workforce and General Population. Journal of Public Health Management and Practice, 30(1), E14–E20. https://doi.org/10.1097/phh.0000000000001837

Donnelly, R., & Farina, M. P. (2021). How do state policies shape experiences of household income shocks and mental health during the COVID-19 pandemic? Social Science & Medicine, 269, 113557. https://doi.org/10.1016/j.socscimed.2020.113557

Duong, C. B., Van Tran, N., Nguyen, A. H., et al. (2023). Impacts of COVID-19 crisis and some related factors on the mental health of 37150 Vietnamese students: a cross-sectional online study. BMC Public Health, 23(1). https://doi.org/10.1186/s12889-023-15317-3

Etienne K. (2023). It's time to harness the power of connection for our health and well-being. Available online: https://www.who.int/news-room/commentaries/detail/it-s-time-to-harness-the-power-of-connection-for-our-health-and-well-being (accessed on 8 January 2024).

Galea, S., Merchant, R. M., & Lurie, N. (2020). The Mental Health Consequences of COVID-19 and Physical Distancing. JAMA Internal Medicine, 180(6), 817. https://doi.org/10.1001/jamainternmed.2020.1562

Ganesan, B., Al-Jumaily, A., Fong, K. N. K., et al. (2021). Impact of Coronavirus Disease 2019 (COVID-19) Outbreak Quarantine, Isolation, and Lockdown Policies on Mental Health and Suicide. Frontiers in Psychiatry, 12. https://doi.org/10.3389/fpsyt.2021.565190

Giannopoulou, I., Galinaki, S., Kollintza, E., et al. (2021). COVID-19 and post-traumatic stress disorder: The perfect 'storm' for mental health (Review). Experimental and Therapeutic Medicine, 22(4). https://doi.org/10.3892/etm.2021.10596

Grace, M. K. (2021). COVID-19 bereavement, depressive symptoms, and binge drinking. SSM - Mental Health, 1, 100041. https://doi.org/10.1016/j.ssmmh.2021.100041

Ho Chi Minh City Center for Diseses Control. (2022). Ho Chi Minh City: Epidemic situation in week 52. Available online: https://hcdc.vn/tphcm-tinh-hinh-dich-benh-tuan-52-tinh-den-ngay-25122022-7ddd5c284b0444f1bdd3df683fab41dd.html (accessed on 16 January 2024).

Huynh, P. T. A., & Bui, T. T. (2024). Household-level demographic and socio-economic vulnerability in the face of the COVID-19 pandemic in rural Central Vietnam. Research in Globalization, 8, 100186. https://doi.org/10.1016/j.resglo.2023.100186

Kang, L., Li, Y., Hu, S., et al. (2020). The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. The Lancet. Psychiatry, 7(3), e14. https://doi.org/10.1016/S2215-0366(20)30047-X

Kang, L., Ma, S., Chen, M., et al. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. Brain, Behavior, and Immunity, 87, 11–17. https://doi.org/10.1016/j.bbi.2020.03.028

Kathirvel, N. (2020). Post COVID-19 pandemic mental health challenges. Asian Journal of Psychiatry, 53, 102430. https://doi.org/10.1016/j.ajp.2020.102430

Kato, T. A., Sartorius, N., & Shinfuku, N. (2020). Forced social isolation due to COVID-19 and consequent mental health problems: Lessons from hikikomori. Psychiatry and Clinical Neurosciences, 74(9), 506–507. https://doi.org/10.1111/pcn.13112

Kudoh, R., Komiya, K., Shinohara, A., et al. (2023). Marital status and post-COVID-19 conditions. Respiratory Investigation,

61(2), 181–185. https://doi.org/10.1016/j.resinv.2023.01.001

Lueck, J. A., Callaghan, T., & Scherr, S. (2021). Suicidal Ideation During the COVID-19 Pandemic: Investigating Mental Health, COVID-19 Health Beliefs, and News Media Consumption in the United States Population in the Year 2020. OMEGA—Journal of Death and Dying, 88(3), 1168–1180. https://doi.org/10.1177/00302228211062361

Ministry of Planning and Investment—General Statistics Office. (2021). Report on the COVID-19 Impacts on Labour and Employment Situation in the Third Quarter of 2021. Available online: https://www.gso.gov.vn/en/data-and-statistics/2021/10/report-on-the-covid-19-impacts-on-labour-and-employment-situation-in-the-third-quarter-of-2021/ (accessed on 8 January 2024).

Nearchou, F., Flinn, C., Niland, R., et al. (2020). Exploring the Impact of COVID-19 on Mental Health Outcomes in Children and Adolescents: A Systematic Review. International Journal of Environmental Research and Public Health, 17(22), 8479. https://doi.org/10.3390/ijerph17228479

Nguyen, H. B., Nguyen, T. H. M., Vo, T. H. N., et al. (2022). Post-traumatic stress disorder, anxiety, depression and related factors among COVID-19 patients during the fourth wave of the pandemic in Vietnam. International Health, 15(4), 365–375. https://doi.org/10.1093/inthealth/ihac040

Nguyen, N. P. T., Nguyen, H. P. A., Dang, C. K., et al. (2024). Mental Health Among Healthcare Workers During the COVID-19 Pandemic in Vietnam. Journal of Preventive Medicine and Public Health, 57(1), 37–46. https://doi.org/10.3961/jpmph.23.327

Ojha, S., & Thapa, S. B. (2023). Psychological distress and suicidality in psychiatric patients during the COVID-19 pandemic in Norway: A repeated cross-sectional study. SSM—Mental Health, 4, 100286. https://doi.org/10.1016/j.ssmmh.2023.100286

Panchal, N., Kamal, R., Orgera, K., et al. (2021). The implications of COVID-19 for mental health and substance use. Kaiser family foundation, 21, 1–16.

Patel, K., Robertson, E., Kwong, A. S. F., et al. (2022). Psychological Distress Before and During the COVID-19 Pandemic Among Adults in the United Kingdom Based on Coordinated Analyses of 11 Longitudinal Studies. JAMA Network Open, 5(4), e227629. https://doi.org/10.1001/jamanetworkopen.2022.7629

Population and Family Planning Sub-department. (2023). How much is the current total population of Ho Chi Minh City. Available online: https://dansohcm.gov.vn/tin-chuyen-nghanh/12033/tong-dan-tp-hcm-hien-nay-bao-nhieu/ (accessed on 8 January 2024).

Preti, E., Di Mattei, V., Perego, G., et al. (2020). The Psychological Impact of Epidemic and Pandemic Outbreaks on Healthcare Workers: Rapid Review of the Evidence. Current Psychiatry Reports, 22(8). https://doi.org/10.1007/s11920-020-01166-z

Que, J., Shi, L., Deng, J., et al. (2020). Psychological impact of the COVID-19 pandemic on healthcare workers: a cross-sectional study in China. General Psychiatry, 33(3), e100259. https://doi.org/10.1136/gpsych-2020-100259

Romero, M., Caicedo, M., Díaz, A., et al. (2023). Post-COVID-19 syndrome: Descriptive analysis based on a survivors' cohort in Colombia. Global Epidemiology, 6, 100126. https://doi.org/10.1016/j.gloepi.2023.100126

Schieman, S., Badawy, P. J., A. Milkie, M., et al. (2021). Work-Life Conflict During the COVID-19 Pandemic. Socius: Sociological Research for a Dynamic World, 7, 237802312098285. https://doi.org/10.1177/2378023120982856.

Son, H. V., Thien, Đ. T., Quan, B. H., et al. (2022). Measures for caring students' post-COVID-19 mental health: School management approach. Scientific Journal, 19(7), 1002.

Stroebe, M., Schut, H., & Stroebe, W. (2007). Health outcomes of bereavement. The lancet, 370(9603), 1960–1973.

Thang, N. V., Binh, N. T., Anh, V. M., et al. (2024). Depression, anxiety, and stress among patients after 12 months of COVID-19 recovery. Thai Binh Medical Journal, 10.

Thomas, N., Gurvich, C., Huang, K., et al. (2022). The underlying sex differences in neuroendocrine adaptations relevant to Myalgic Encephalomyelitis Chronic Fatigue Syndrome. Frontiers in Neuroendocrinology, 66, 100995. https://doi.org/10.1016/j.yfrne.2022.100995

Thuy, N. T. T., Anh, N. T., & Than, N. H. (2023). The impacts of post-COVID pandemic on physical and mental health of medical healthcare workers and university students diagnosed with COVID-19 in Binh Duong Province and Ho Chi Minh City. Thu Dau Mot University Scientific Journal.

Tudor, L., Harenwall, S., Henderson, R., et al. (2023). Post-covid-19 syndrome: Self-compassion and psychological flexibility moderate the relationship between physical symptom load and psychosocial impact. Acta Psychologica, 241, 104093. https://doi.org/10.1016/j.actpsy.2023.104093

Umberson, D., & Chen, M. D. (1994). Effects of a Parent's Death on Adult Children: Relationship Salience and Reaction to Loss.

American Sociological Review, 59(1), 152. https://doi.org/10.2307/2096138

Vadivel, R., Shoib, S., El Halabi, S., et al. (2021). Mental health in the post-COVID-19 era: challenges and the way forward. General Psychiatry, 34(1), e100424. https://doi.org/10.1136/gpsych-2020-100424

Wakam, G. K., Montgomery, J. R., Biesterveld, B. E., et al. (2020). Not Dying Alone—Modern Compassionate Care in the Covid-19 Pandemic. New England Journal of Medicine, 382(24), e88. https://doi.org/10.1056/nejmp2007781

World Health Organization (WHO). (2022). Mental health and COVID-19: early evidence of the pandemic's impact: scientific brief, 2 March 2022. Available online: https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-Mental_health-2022.1 (accessed on 19 January 2024).

World Health Organization (WHO). (2023). Coronavirus disease (Covid-19): Post Covid-19 condition, 28 March 2023. World Health Organization. Available online: https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-(covid-19)-post-covid-19-condition (accessed on 8 January 2024).

Xiong, J., Lipsitz, O., Nasri, F., et al. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. Journal of Affective Disorders, 277, 55–64. https://doi.org/10.1016/j.jad.2020.08.001

Young, K. S., Purves, K. L., Hübel, C., et al. (2022). Depression, anxiety and PTSD symptoms before and during the COVID-19 pandemic in the UK. Psychological Medicine, 53(12), 5428–5441. https://doi.org/10.1017/s0033291722002501

Zacher, M., Raker, E. J., Meadows, M. C., et al. (2023). Mental health during the COVID-19 pandemic in a longitudinal study of Hurricane Katrina survivors. SSM—Mental Health, 3, 100198. https://doi.org/10.1016/j.ssmmh.2023.100198

Zhu, C., Zhang, T., Li, Q., et al. (2022). Depression and Anxiety During the COVID-19 Pandemic: Epidemiology, Mechanism, and Treatment. Neuroscience Bulletin, 39(4), 675–684. https://doi.org/10.1007/s12264-022-00970-2

Zhu, Y., Li, Y., & Xu, X. (2022). Suicidal ideation and suicide attempts in psychiatric patients during the COVID-19: A systematic review and meta-analysis. Psychiatry Research, 317, 114837. https://doi.org/10.1016/j.psychres.2022.114837