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Levels of Stress, Anxiety, and Depression in Adolescents during and after the COVID-19 Pandemic in Vietnam: A Cross-sectional study

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Abstract
Stress, anxiety, and depression are critical mental health concerns that significantly impact adolescent psychological development, necessitating systematic and scientific investigation to inform effective prevention and intervention measures, particularly during social crises. This study utilized the Vietnamese version of the DASS-21 scale to assess 8,473 adolescents across six provinces in Vietnam, aiming to determine the prevalence and examine key factors influencing stress, anxiety, and depression during and after the COVID-19 pandemic. Findings indicate that the prevalence rates of stress, anxiety, and depression among Vietnamese adolescents during the pandemic were 65.5%, 41.5%, and 34.2%, respectively, declining to 55.4%, 25.4%, and 20.1% in the post-pandemic period. Key factors influencing adolescent emotional well-being included the quality of parent-child relationships, duration of electronic device use, and sleep quality. Positive family relationships served as protective factors against anxiety, whereas excessive technology use exacerbated negative symptoms. In the post-pandemic period, engagement in extracurricular activities and the adoption of a positive lifestyle played a more prominent role in mental well-being. This study underscores the necessity of regulating technology use and enhancing family engagement as integral components of prevention strategies and early intervention programs for adolescent mental health in the context of social crises and post-crisis adaptation.

Keywords: Stress, Anxiety, Depression, Adolescents, COVID-19

Introduction

Adolescence is a critical developmental phase characterized by significant physical, social, and psychological changes, increasing vulnerability to internal and external stressors. More specifically, the prevalence of adolescent mental health issues, including stress, anxiety, and depression, continues to rise (Anjum et al., 2022; WHO, 2023). The COVID-19 pandemic further exacerbated these conditions, with studies estimating the prevalence of anxiety disorders at 25% and depression at 31% among adolescents (Silva Junior et al., 2020). If left undetected and untreated, these conditions may escalate from subclinical to clinical levels, leading to severe long-term consequences (Muyiduli et al., 2024; Muhammad Khir et al., 2024). Studies have reported adolescent anxiety and depression rates ranging from 34% to 50% in Vietnam (Nguyen et al., 2021), with rates persisting at approximately 30% and 25%, respectively, in the post-pandemic period (Le et al., 2022). Contributing factors include exposure to distressing information on social media (Tandon, 2020), social isolation (Xie et al., 2020), the online learning environment (Jones et al., 2021), and family pressures (Ravens-Sieberer et al., 2021). A study by Ho et al. (2022) found that academic stress increased among high school students, particularly during the COVID-19 pandemic. Additionally, the study highlighted that life satisfaction significantly impacts academic stress and depressive disorders in adolescents. Another study by Le & Tran (2021) identified time spent on social media and academic pressure as key factors contributing to anxiety and depression among high school students during the COVID-19 pandemic. Therefore, this study aims to systematically assess and compare the prevalence and influencing factors of stress, anxiety, and depression among Vietnamese adolescents during and after the COVID-19 pandemic. The findings will contribute to theoretical advancements in adolescent mental health and provide empirical data to inform intervention strategies tailored to crisis and post-crisis contexts.

Literature review

Stress, anxiety, and depression are complex psychological issues that significantly impact adolescents. Numerous studies have been conducted worldwide to assess their prevalence and identify contributing factors, aiming to develop effective prevention and intervention strategies. Before the outbreak of the COVID-19 pandemic, many studies focused on analyzing stress, anxiety, and depression in adolescents. Multiple psychosocial stressors have been identified as risk factors for the development of these conditions. These include heightened exposure to distressing information on social media (Tandon, 2020), social isolation (Xie et al., 2020), disruptions

caused by online learning environments (Jones et al., 2021), and increased familial pressures (Ravens-Sieberer et al., 2021). In the United States, Auerbach et al. (2014) suggested that adolescence is a peak period for stress and depression, largely associated with nervous system development. Their study examined the relationship between reward-processing mechanisms and stress and depression levels, proposing three models to explain the impact of rewards on adolescent mental health. Sandal et al. (2017) conducted a study in India and reported the prevalence rates of stress, anxiety, and depression among adolescents as 65.53%, 80.85%, and 47.02%, respectively. They found that emotional disorders were more common in males than females. Similarly, a comparative study by Prabha et al. (2017) found that anxiety and depression were more prevalent in urban areas than in rural areas. Specifically, 35.41% of boys experienced anxiety compared to 29.41% of girls. Windarwati et al. (2020) studied 851 adolescents in Indonesia and concluded that family harmony significantly influences adolescent stress levels ($p = 0.013$) but is not significantly related to anxiety ($p = 0.071$) or depression ($p = 0.13$). Their findings suggest that adolescents living in harmonious family environments exhibit better mental health. In the United States, Henry et al. (2020) examined the impact of psychological stress within and outside the family as a risk factor for depressive symptoms in adolescents with depressed mothers. The results indicated that peer stress was associated with anxiety and depressive symptoms when maternal depressive symptoms were moderate or high but had no significant effect when maternal depressive symptoms were low. Selçuk et al. (2021) conducted a study in Türkiye and found that during the COVID-19 pandemic, adolescents exhibited symptoms of anxiety (28%), depression (37.6%), and post-traumatic stress disorder (PTSD) (28.5%). Shrestha et al. (2023) assessed the prevalence of stress, anxiety, and depression in Nepal and reported lower rates: 3.16% for stress, 37.89% for anxiety, and 32.63% for depression. In the Vietnamese context, Nguyen et al. (2024) found that 34% to 50% of adolescents experienced stress, anxiety, and depression—rates higher than the global average of 25% to 31% (Silva Junior et al., 2020). Some studies suggest that the prevalence of these conditions among adolescents has remained unchanged over time (Anjum et al., 2022; WHO, 2023). Windarwati et al. (2022) explored the relationship between stress, anxiety, depression, and suicidal ideation in Indonesian adolescents during the post-COVID-19 period. They found that 44.4%, 72.7%, and 71.4% of adolescents experienced stress, anxiety, and depression, respectively. Additionally, 23.7% of adolescents reported suicidal thoughts, with 12.4% exhibiting high suicidal ideation.

On the other hand, despite the return of social activities to normal after the COVID-19 pandemic, stress, anxiety, and depression among adolescents remain high. Gupta et al. (2022) conducted a study in West Bengal, India, reporting that the prevalence rates of depression, anxiety, and stress were 52.3%, 47.4%, and 33.7%, respectively. These mental health issues were more common among female students, late adolescents (16–19 years old), individuals experiencing family-related social problems, and those who frequently used stimulants (Gupta et al., 2022). A study by Köse Kabakcıoğlu and Ayaz-Alkaya (2024) in Türkiye examined the effectiveness of progressive muscle relaxation as a therapy for reducing stress, anxiety, and depression in adolescents. The experimental results indicated that this method significantly alleviated these conditions, suggesting its potential application in supporting adolescents in managing psychological challenges (Kabakcıoğlu & Ayaz-Alkaya, 2024). After the pandemic ended, the level of stress, anxiety and depression measured by the DASS21 scale decreased significantly, indicating the resilience and adaptation of adolescents in the post-Covid-19 period. The results from this study are consistent with many other studies, such as those by Smith et al. (2020) and Huong & Huong (2023) showed that the negative impact of the pandemic on the mental health of Vietnamese children and adolescents. However, some post-COVID-19 studies have reported a continuing trend in the persistence and severity of mental health issues, such as anxiety, depression, and stress, particularly in Vietnam. Stress, anxiety, and depression have remained critical research topics before, during, and after the COVID-19 pandemic, with studies focusing on their prevalence, manifestations, and influencing factors. Additionally, in Vietnam, no large-scale, comprehensive comparative study has been conducted to assess the levels and determinants of stress, anxiety, and depression in adolescents during and after the COVID-19 pandemic. Comparative research across different stages of the pandemic is essential for accurately evaluating these mental health conditions among Vietnamese adolescents, providing a deeper understanding of both the short-term and long-term psychological impacts of the pandemic. Such insights will be crucial in developing effective intervention strategies to support adolescent mental well-being.

We will suggest these hypotheses below:

H1: The level of stress, anxiety, and depression among Vietnamese adolescents during the Covid-19 period was high, with a clear downward trend in the post-Covid-19 period. The levels of stress, anxiety, and depression at the “severe” and “very severe” levels were mainly concentrated during the Covid-19 period.

H2: There are many factors affecting the level of stress, anxiety, and depression of Vietnamese adolescents, in which, the nature of the relationship between adolescents and their parents and the time spent using computers, phones, and social networks have a clear impact both during the Covid-19 period and the post-Covid-19 period.

Methods

Participants

The study sample consisted of 8,473 adolescents from grades 6 to 12, randomly selected from junior high and high schools in 6 provinces representing the South (Ho Chi Minh City, Dong Nai Province, Long An Province) and the North of Vietnam (Hanoi City, Hai Duong Province, Vinh Phuc Province). Sampling was conducted using the convenient random sampling method, ensuring relative representation for grades and geographical areas.

Table 1. Distribution of research samples by area of residence in Vietnam

Grade block	Countryside		City		Total	
	N	(%)	N	(%)	n	(%)
Grade 6	1098	20.8	212	6.8	1310	15.6
Grade 7	1155	21.9	187	6.0	1342	16.0
Grade 8	1095	20.8	150	4.8	1245	14.8
Grade 9	1063	20.2	263	8.4	1326	15.8
Grade 10	290	5.5	943	30.2	1233	14.7
Grade 11	240	4.6	687	22.0	927	11.1
Grade 12	328	6.2	678	21.7	1006	12.0
Total	5269	100.0	3120	100.0	8389	100.0

Measures

The Depression, Anxiety, and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) was utilized to assess emotional distress. The scale comprises 21 items, categorized into three subscales: stress, anxiety, and depression. Responses were rated on a four-point Likert scale ranging from 0 (never) to 3 (very often). The Vietnamese-adapted version of the DASS-21 has demonstrated strong reliability, with Cronbach's alpha coefficients exceeding 0.7 for all subscales (Nunnally & Bernstein, 1994). Additional variables, including sleep duration, electronic device usage, physical activity levels, and family relationships, were assessed through a supplementary questionnaire. These items were also tested for reliability, yielding Cronbach's alpha coefficients above 0.7.

Procedure

The study was conducted using a cross-sectional design at two different points in time. The first survey was conducted in December 2021, when the Covid-19 pandemic was complicated in Vietnam. The second survey was conducted in January 2023, when the Covid-19 pandemic was under control and society returned to a "new normal" state. The second survey was conducted in the same schools as the first survey, using the same screening tool via the Google form. Students participating in the study were clearly informed about the purpose of the survey and participated voluntarily.

Data Analysis

Data was processed and analyzed using SPSS 22.0 statistical software. Statistical analyses included: frequency and percentage analysis to describe sample characteristics and levels of stress, anxiety, and depression; Cronbach's Alpha reliability analysis to test the internal consistency of the DASS-21 scales; analysis of variance (ANOVA) and T-test to compare levels of stress, anxiety, and depression between different groups of subjects and other advanced statistical analyses. In addition, multivariate regression analysis was also used to assess factors affecting levels of stress, anxiety, and depression during and after the Covid-19 period. Multivariate regression analysis helps determine the level of influence of each independent factor in explaining the variation in levels of stress, anxiety, and depression in adolescents at different measurement times.

Results

Table 2. Results of screening for stress, anxiety, and depression

Variables	**During Covid-19**		**After Covid-19**		**p**
	M	**SD**	**M**	**SD**	
Stress	11.80	9,022	8.08	8,335	<0.01
Anxiety	7.16	6,991	4.77	6,028	<0.01
Depression	7.73	8,287	4.91	7.008	<0.01
DASS21 Score	26.68	22.00	17.76	19.43	<0.01
Total (n)	4052		4337		

The screening results showed that the average score of the DASS21 scale during the Covid-19 period was 26.68 (Mean= 26.68), 4.61 points higher than the post-pandemic period (Average score= 22.07) ($p < 0.01$). This phenomenon was observed in all three indicators of stress, anxiety, and depression. Thus, specific conditions during the pandemic period had a negative impact, promoting the level of stress, anxiety, and depression in adolescents (see **Table 2**)

Table 3: Screening results of stress, anxiety, and depression levels in Vietnamese adolescents using the DASS21 test

Level	After Covid-19		During Covid-19		Total	
	N	%	N	%	n	%
Stress level						
No stress	2370	54.6	1399	34.5	3769	44.9
Light	319	7.4	357	8.8	676	8.1
Fit	839	19.3	959	23.7	1798	21.4
Heavy	330	7.6	511	12.6	841	10.0
Very heavy	479	11.0	826	20.4	1305	15.6
Anxiety level						
Reckless	3236	74.6	2410	59.5	5646	67.3
Light	298	6.9	370	9.1	668	8.0
Fit	494	11.4	728	18.0	1222	14.6
Heavy	163	3.8	254	6.3	417	5.0
Very heavy	146	3.4	290	7.2	436	5.2
Depression level						
No depression	3464	79.9	2666	65.8	6130	73.1
Light	378	8.7	541	13.4	919	11.0
Fit	322	7.4	516	12.7	838	10.0
Heavy	86	2.0	178	4.4	264	3.1
Very heavy	87	2.0	151	3.7	238	2.8
Total (n)	4337		4052		8389	

Stress level: During the Covid-19 period, the rate of adolescents showing signs of stress was 65.5%, of which 33% were at severe and very severe levels. After the pandemic ended, this rate dropped to 55.4%, with only 18.6% at the severe and very severe levels. This shows that although a large number of adolescents still show signs of stress, the severity has decreased significantly in the post-Covid-19 period.
Anxiety level: the mean score of the anxiety subscale decreased from 7.16 during Covid-19 to 4.77 after the pandemic ended ($p<0.001$). The proportion of adolescents without anxiety increased from 59.5% to 74.6%. During Covid-19, 14.5% of adolescents had severe and very severe anxiety, which decreased after the pandemic to only 7.2% (sig.<0.001).
Depression level: the mean depression score measured by the DASS21 scale decreased from 7.73 during the Covid-19 period to 4.91 after the pandemic (sig.<0.001). The proportion of adolescents without depression after the pandemic was 79.9%, compared to 65.8% during the Covid-19 period. During the Covid-19 period, 8.1% of adolescents had severe and very severe depression, while after the pandemic ended, only 4% had depression.

Thus, the research results confirmed that the Covid-19 pandemic has significantly increased the level of stress, anxiety and depression in adolescents in Vietnam, especially at the "severe" and "very severe" levels. The results of this study allow to confirm hypothesis **H1**: "The level of stress, anxiety and depression of Vietnamese adolescents during the Covid-19 period is high and tends to decrease significantly in the post-Covid-19 period. Levels of stress, anxiety, and depression at “severe” and “very severe” levels were concentrated mainly during the Covid-19 period.

Factors affecting the levels of stress, anxiety, and depression in Vietnamese adolescents during and after the Covid-19 period

Table 4. Correlation between stress, anxiety, and depression levels in Vietnamese adolescents during the Covid-19 period

Variables	Stress	Anxiety	Depression
Stress	1		
Anxiety	0.653 **	1	
Depression	0.592 **	0.604 **	1

*Note: **p< 0.01*

Table 5. Correlation between stress, anxiety, and depression levels in Vietnamese adolescents after the Covid-19 period

Variables	Stress	Anxiety	Depression
Stress	1		
Anxiety	0.644 **	1	
Depression	0.610 **	0.608 **	1

*Note: **p< 0.01*

The results showed that there was a positive, close, and significant correlation between stress, anxiety, and depression in adolescents (0.592<*r*< 0.592) p <0.01) (see **Table 4,5**).

Using multivariate regression analysis to determine factors affecting the levels of stress, anxiety, and depression of adolescents during and after the post-Covid-19 pandemic period, we found that the statistical parameters were qualified to perform regression analysis. The sig. coefficients of both regression models (during and after Covid-19) were less than 0.01 (see **Table 6**); adjusted R2 were 0.190 and 0.182, respectively. Other statistical parameters in both models ensured reliability, including: ***DW*** = 0.353, and 0.340; ***VIF***< 2 (see **Table 6**). According to statistical standards, these coefficients ensured the exclusion of first-order serial correlation and multicollinearity in the two analyzed models (Hair et al., 2018). The remaining unexplained variables in the two models are distributed in a balanced bell-tower diagram. Thus, all statistical data allow to conclude: the two regression models (during the Covid-19 period and after the Covid-19 period) are reliable enough to predict factors affecting the level of stress, anxiety, and depression of adolescents.

Table 6. Results of regression analysis of factors affecting the level of stress, anxiety, and depression (expressed by DASS21 score) during the Covid-19 pandemic

Variables	Beta Coefficients	T	Sig.	VIF
(Constant)		5.573	0.000	
Sex	0.053	3.455	0.001	1.181
Residential area	0.042	2.472	0.013	1.475
Nature of relationship with parent	0.272	18.997	0.000	1.023
Level of social distancing	0.073	4.941	0.000	1.094
Learning format	0.074	4.524	0.000	1.334
Time of day sleep	-0.149	-10.378	0.000	1.032
Time spent using computer and phone	0.176	10.744	0.000	1.342
Sports time during the day	-0.087	-5.547	0.000	1.217
Age of minors	-0.086	-5.200	0.000	1.377

Table 7. Results of regression analysis of factors affecting the level of stress, anxiety, and depression (DASS21 score) after the Covid-19 pandemic

Variables	**Beta Coefficients**	**T**	**Sig.**	**VIF**
(Constant)		1.936	0.053	
Sex	0.049	3.270	0.001	1.193
Residential area	0.023	1.408	0.159	1.409
Nature of relationship with parent	0.293	20.991	0.000	1.031
Time of day sleep	-0.056	-3.984	0.000	1.029
Time spent using computer and phone	0.258	16.121	0.000	1.354
Sports time during the day	-0.064	-4.267	0.000	1.204
Age	-0.063	-3.751	0.000	1.500

The results of regression analysis on factors affecting the levels of stress, anxiety, and depression during and after Covid-19 showed that there are many factors affecting the levels of stress, anxiety, and depression in adolescents. Specifically, factors that have a positive impact on the level of stress, anxiety, and depression include: "nature of the relationship with parents", with a Beta coefficient of 0.272 during the Covid-19 period (β= 0.272, see **Table 6**) and 0.293 after Covid-19 (β= 0.293, see **Table 7**).

Regarding "time spent using computers and phones", with a Beta coefficient of 0.176 during the Covid-19 period (β= 0.176, see **Table 6**) and 0.258 after Covid-19 (β= 0.258, see **Table 7**). This shows that a good relationship and support between parents and adolescents; limiting the time spent using technology devices can reduce feelings of loneliness and anxiety in children, thereby controlling the level of stress, anxiety, and depression. In addition, "gender" is also an influential factor, with a Beta coefficient of 0.053 during the Covid-19 period (β= 0.053, see **Table 6**) and 0.049 after the pandemic (β= 0.049, see **Table 7**). This proves that women are at higher risk of stress, anxiety, and depression than men.

In contrast, factors that had a negative effect on stress, anxiety, and depression levels included: "sleep time", with a negative Beta coefficient (β= -0.149 during Covid-19, see **Table 6** and β= -0.056 after Covid-19, see **Table 7**), indicating that adolescents who slept enough time and had good sleep quality were less likely to have negative psychological symptoms. Regarding "Sports time", this also had a negative Beta coefficient (β= -0.087 during Covid-19, see **Table 6** and β= -0.064 after Covid-19, see **Table 7**), indicating that active physical activity has the ability to reduce feelings of stress, anxiety, and depression. Finally, "age" of adolescents also had a negative effect, indicating that

older children were less affected by negative psychological factors than younger children. Thus, the results of the regression analysis allow to conclude that "nature of relationship with parents", "time spent using computers, phones" and "sleep time" are the most important factors affecting children's emotional state, while "gender", "age", "area of residence" and "form of study" also have an influence but at a lower level. These findings lead to the conclusion that to prevent and intervene in stress, anxiety and depression in adolescents, improving family relationships, managing time spent using technological devices and maintaining sleep quality are essential.

Among the factors affecting the level of stress, anxiety, and depression in adolescents, the nature of the relationship between parents and adolescents and the amount of time spent using phones, computers, and social networks have a strong impact on the level of stress, anxiety, and depression in adolescents. This allows us to confirm hypothesis **H2**: "There are many factors affecting the level of stress, anxiety, and depression in Vietnamese adolescents, in which the nature of the relationship between adolescents and their parents and the amount of time spent using computers, phones, and social networks have a clear impact both during the Covid-19 period and the post-Covid-19 period".

Discussion

A synthesis of domestic and international studies indicates that, prior to the COVID-19 pandemic, the prevalence of stress, anxiety, and depression among adolescents remained relatively low and stable. In Vietnam, during the pandemic, the prevalence of anxiety symptoms among adolescents fluctuated between 12% and 15%, while depressive symptoms ranged from 10% to 15% (Do & Nguyen, 2020; Pham et al., 2019). However, these rates increased significantly, with anxiety disorders reported at 37% to 47% and depressive symptoms at 35% to 43% (Nguyen et al., 2021). Our findings during this period align with previous studies on Vietnamese adolescents, underscoring the substantial impact of the COVID-19 pandemic on adolescent mental health and contributing to a sharp rise in stress, anxiety, and depression. This study provides compelling evidence of the pandemic's adverse psychological effects on Vietnamese adolescents. These findings are consistent with prior international studies, such as those conducted by Xie et al. (2020) and Wang et al. (2020), which reported a significant increase in psychological distress among children and adolescents during the pandemic. Following the end of the pandemic, social conditions and daily activities gradually returned to normal. Our research findings indicate that the prevalence of stress, anxiety, and depression among adolescents decreased to 55.4%, 25.4%, and 20.1%, respectively, representing a significant reduction compared to the pandemic period ($p < 0.001$). These results closely align with other studies conducted in Vietnam in the post-pandemic period, which reported screening rates for anxiety symptoms ranging from 25% to 30% and depressive symptoms between 20% and 25% (Le et al., 2022; Hung et al., 2022). Our cross-sectional study confirms that the prevalence of stress, anxiety, and depression among adolescents declined significantly both during and after the pandemic ($p < 0.001$). However, despite this decline, these conditions remained more prevalent than before the pandemic. This finding highlights the need for sustained support measures to help adolescents manage stress and enhance their mental well-being during the post-crisis adaptation period.

Regarding factors influencing adolescent mental health during and after the pandemic, our research presents new insights. The findings demonstrate a strong correlation between the quality of the parent-child relationship and levels of stress, anxiety, and depression among Vietnamese adolescents. This result supports prior studies, such as those by Liu et al. (2021), and suggests a promising direction for future research on the role of family dynamics in adolescent mental health within the context of prolonged crises and post-crisis adaptation. These findings indicate that addressing adolescent mental health requires not only medical and educational interventions but also family-based approaches, particularly parental involvement, to promote psychological well-being. A particularly notable finding of this study is the relationship between electronic device and social media use and adolescent mental health, both during and after the pandemic. This is especially significant in Vietnam, a country with a rapidly growing digital landscape and a predominantly young population, where technology use has a clear impact on adolescent well-being.

Limitations and contributions

The study findings have important implications for the prevention and intervention of mental health issues among adolescents. Ensuring adolescent mental well-being requires monitoring and regulating screen time, managing sleep quality, and promoting physical activity. Additionally, fostering positive family relationships, enhancing communication, and strengthening parental support should be prioritized as key intervention strategies.

Future research should explore the relationship between technology use and adolescent psychological well-being, particularly in the context of emerging crises such as climate change and potential future pandemics. Furthermore, expanding research to include diverse socio-cultural factors will provide a more comprehensive understanding of adolescent mental health in different social contexts.

Our findings not only align with previous studies in Vietnam and internationally but also contribute to a deeper understanding of the role of family, technology, and social factors in shaping adolescent mental health. To effectively prevent and mitigate stress, anxiety, and depression, coordinated efforts among families, schools, and communities are essential to fostering a supportive and positive environment for adolescents.

Conclusion

The findings indicate that levels of stress, anxiety, and depression among adolescents increased significantly during the COVID-19 pandemic. The stressful and unstable environment during this period had a profound impact on their mental well-being. Although a decline in these conditions was observed after the pandemic, the prevalence of emotional disorders remained higher than pre-pandemic levels. This persistence underscores the need for continued psychological support measures to facilitate the full recovery of adolescents from mental health challenges.

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