

## Original Article

# The Impact of COVID-19 Pandemic on Mental Health Among High School Students in Medina, Saudi Arabia

Nadir Makki <sup>1</sup>, Lina Aljohani <sup>2\*</sup>, Ahlam Aljohani <sup>2</sup>, Sarah Ali <sup>2</sup>, Arwa Aljuhani <sup>2</sup>, Hamdah Alotaibi <sup>2</sup>, Razan Alahmadi <sup>2</sup>, Asma Alharbi <sup>2</sup>

<sup>1</sup> Faculty of Medicine, Al-Rayan Colleges, Medina, Saudi Arabia

<sup>2</sup> College of Medicine, Al-Rayan Colleges, Medina, Saudi Arabia

Correspondence should be addressed to **Lina Aljohani**, North Jeddah Specialized Dental Center, King Abdullah Medical Complex, Jeddah, Saudi Arabia. Email: [lina.mohammed369@gmail.com](mailto:lina.mohammed369@gmail.com)

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### Abstract

**Background:** The COVID-19 pandemic led to many adverse mental health consequences from the lockdown. It caused an exacerbation of depression, anxiety, and other mental disorders. Among the affected populations, high school students were one of the most commonly affected groups. This study is aimed to assess the psychological impact as well as the prevalence of depression and anxiety levels among high school female students during the COVID-19 outbreak in Medina, Saudi Arabia.

**Methods:** This is a cross-sectional study that was conducted on a total of 300 high-school female students in Medina, Saudi Arabia between April 2021 and June 2021. Data were collected via an online survey to measure depression and anxiety using the Patient Health Questionnaire 9 (PHQ-9) and Generalized Anxiety Disorder 7 (GAD-7) questionnaires, respectively.

**Result:** A total of 300 students participated in this study. All the participants were female. The overall prevalence of depression among the female students was 2.2%, while anxiety was prevalent among 2.7% of the high school students. On the other hand, 10.3% of the sample had suicidal thoughts.

**Conclusion:** A lower prevalence of depression, anxiety, and stress was reported among female high-school students. However, higher suicidal thoughts observed in students highlighted their need for mental healthcare by providing psychological support programs.

**Keywords:** COVID-19, anxiety, depression, female, high-school students, PHQ-9, GAD-7

## Introduction

Coronavirus Disease 2019 (COVID19) is a new infectious disease that was caused by a new strain of coronavirus called severe acute respiratory syndrome coronavirus (SARS). The first outbreak reported was in December 2019, in Wuhan, China (1). It was a case of pneumonia of unknown etiology linked to a seafood market exposure. Ever since, it has been classified as a global pandemic on March 2020, by the World Health Organization (WHO) (2). Governments imposed strict social distancing measures such as travel restrictions and school closures which led to a serious burden on mental health (3). The first confirmed case in Saudi Arabia was diagnosed on the 7<sup>th</sup> of March 2020 (4). Outbreaks and pandemics are often associated with adverse mental health consequences. The COVID-19 pandemic elucidated mental health importance by studying various affected individuals which including high school students. On the 9<sup>th</sup> of March 2020, the Saudi Ministry of Education closed all schools and universities, and all educational activities were shifted to online platforms. It was imposed on the whole country which in turn affected students' motivation, concentration, and social interactions (4, 5).

A previous study among college students was carried out in Greece and reported that the student's anxiety rates increased due to the lockdown. Around 65% reported that it increased slightly while 12.43% were experiencing major depression (6). Internet addiction has been also noted during the lockdown affecting students' performance on several levels, which is an already an established reported concern (7, 8). Studies show that one of the reasons for the negative impact on students' mental health, is the excessive use of the internet (9). Students may express sleep disorders, impartiality, and restlessness as a result of strong pandemic factors such as public health emergencies and stressful social outcomes (10).

As the coronavirus pandemic rapidly spread across the world causing rapid changes in routine lives, it induced a notably high degree of fear, worry, and concern among the general population. One of the most affected groups is the older adults and people with underlying health conditions. Although several studies have assessed mental health issues during this pandemic, most of the studies were either related to the general population or the healthcare providers. The purpose of this study is to assess the mental health problems during the COVID-19

pandemic and to understand their impact on school students.

## Methodology:

### *Study design*

This cross-sectional survey study was conducted among high-school students in Medina, Saudi Arabia between April 2021 and June 2021. Al-Madinah region is one of the main regions in Saudi Arabia. The target population is high-school female students. We included students aged 15-18 years old and excluded students more than 18 years old. Of a total of 116 schools located in Medina, two were randomly selected to recruit the sample. The first school; The Second High School for Females had a population of 280 students. The second included school; The Fifty High School for Females had a population of 500 students. According to that, Raosoft sample size calculation software was used with a margin of error of 5%, confidence level of 95%, and response distribution of 50% determined a sample size of 258 to be collected. The students were selected by a random sampling technique.

### *Study instrument*

The survey in this study included three parts. In the first part, demographic data including name, age, gender, region, name of school, and class were collected. Afterward, the second part of the survey utilized two pre-validated surveys. The first survey is the Patient Health Questionnaire (PHQ-9) which is utilized to estimate, diagnosis, and identify depression symptoms and includes a total of 9 questions (11). The second survey is the Generalized Anxiety Disorder 7 (GAD-7) questionnaire which is used to estimate, diagnosis, and identify anxiety symptoms and it includes 7 questions (12).

### *Depression measurement*

PHQ-9 survey for assessing depression includes nine items to measure depressive symptoms. The PHQ-9 scores can range between 0 to 27. PHQ-9 measures minimal depression (0-4 score), mild depression (5-9 score), moderate depression (10-14 score), moderately severe depression (15-19 score), and severe depression (20-27 score) [11]. PHQ-9 is designed to measure depression based on the Diagnostic and Statistical Manual of Mental Disorders. It is a reliable tool to measure depression within the population. The PHQ-9 has been previously conducted on students in the

universities of Saudi Arabia and showed good reliability (13).

**Anxiety Measurement**

GAD-7 survey measures anxiety symptoms. It has a total of seven items that follows the full Diagnostic and Statistical Manual of Mental Disorders. The questionnaire is answered by a scoring system with 0 = Not at all, 1 = several days, 2 = more than half the days and 3 = nearly every day. GAD-7 scores range from 0 to 21 and are categorized in four groups determining the anxiety severity level. Scoring of 0-4 is considered minimal anxiety level, 5-9 is mild anxiety, 10-14 is moderate anxiety and 15-21 is severe anxiety.

**Data collection and statistical analysis**

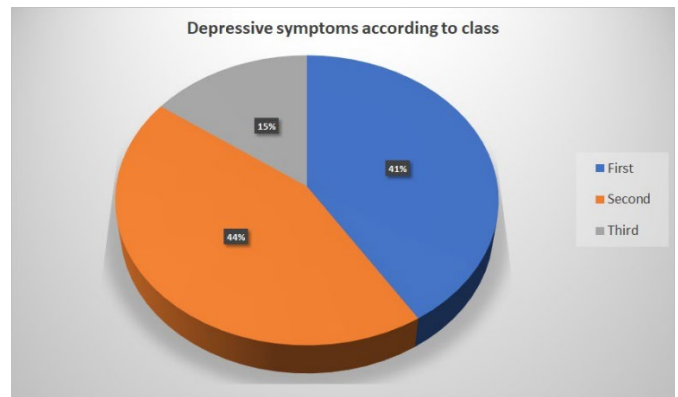
First, the students read the information sheet and were handed an informed consent which must be signed by their guardian. Once the informed consent was provided, they were provided the survey link and proceeded to complete the online survey. After the completion, data was entered into Microsoft Excel and coded. Statistical analysis was done using the SPSS program. chi-square was calculated to determine statistical significance (P<0.05) with a 95% confidence level. Afterwards, a one-way ANOVA test was performed accordingly.

**Results:**

**Sociodemographic characteristics**

A total of 300 students responded to the survey. From the respondents, 44.7% of them were in the second year of secondary school, 40.7% were in the first year of

secondary school and 14.7% were in the third year of secondary school (**Figure 1**).



**Figure 1:** Depressive symptoms among students based on the classes

**PHQ-9**

Regarding those who answered nearly every day, 18% responded as feeling tired or having little energy, 18 % had little interest or pleasure in doing things, 17.7% had Trouble falling or staying asleep, or sleeping too much, 16% feeling down, depressed, or hopeless, 12.3% had poor appetite or overeating, 12% had trouble concentrating on things such as reading the newspaper or watching television, 8.3% answered that they feel bad about themselves or that they are a failure, 7.7% answered thoughts that you would be better off dead or of hurting yourself in some way and 3% reported moving or speaking so slowly that other people could have noticed (**Table 1**). A total score of 7.56 showed the population had more tendency to mild depression.

**Table 1: Respondents to the PHQ-9 survey**

Questions	Not at all	Several days	More than half the days	Nearly everyday
Little interest or pleasure in doing things.	85 (28.3%)	122 (40.7%)	39 (13.0%)	54 (18.0%)
Feeling down, depressed, or hopeless.	110 (36.7%)	98 (32.7%)	44 (14.7%)	48 (16.0%)
Trouble falling or staying asleep or sleeping too much.	111 (37.0%)	70 (23.3%)	66 (22.0%)	53 (17.7%)
Feeling tired or having little energy.	79 (26.3%)	112 (37.3%)	55 (18.3%)	54 (18.0%)
Poor appetite or overeating.	141 (47.0%)	83 (27.7%)	39 (13.0%)	37 (12.3%)
Feeling bad about yourself or that you are a failure	212 (70.6%)	51 (17%)	12 (4%)	25 (8.3%)
Trouble concentrating on things, such as reading the newspaper or watching television.	179 (59.7%)	59 (19.7%)	26 (8.7%)	36 (12.0%)
Moving or speaking so slowly that other people could have noticed?	243 (81.0%)	29 (9.7%)	19 (6.3%)	9 (3.0%)
Thoughts that you would be better off dead or of hurting yourself in some way.	217 (72.3%)	29 (9.7%)	31 (10.3%)	23 (7.7%)

**Anxiety symptoms among healthcare providers**

Regarding the GAD-7 survey, students responded affirmatively to the following as occurring for Always: Becoming easily annoyed or irritable (22.3%), worrying too much about different things (22.3%), not being able to stop or control worrying (15%), feeling nervous,

anxious, or on edge (13.7%), feeling afraid as if something awful might happen (13.7%), trouble relaxing (10.7%), and being so restless that it is hard to sit still (10.3%) (Table 2).

**Table 2: Respondents to the GAD-7**

Anxiety symptoms	Not at all	Several days	More than half the days	Nearly everyday
Feeling nervous, anxious, or on edge.	158 (52.7%)	61 (20.3%)	40 (13.3%)	41 (13.7%)
Not being able to stop or control worrying.	125 (41.7%)	80 (26.7%)	50 (16.7%)	45 (15.0%)
Worrying too much about different things.	87 (29.0%)	96 (32.0%)	50 (16.7%)	67 (22.3%)
Trouble relaxing.	128 (42.7%)	98 (32.7%)	42 (14.0%)	32 (10.7%)
Being so restless that it is hard to sit still.	154 (51.3%)	88 (29.3%)	27 (9.0%)	31 (10.3%)
Becoming easily annoyed or irritable.	82 (27.3%)	95 (31.7%)	56 (18.7%)	67 (22.3%)
Feeling afraid as if something awful might happen.	138 (46.0%)	76 (25.3%)	45 (15.0%)	41 (13.7%)

**Differences in mental health based on class**

(Table 3) shows the results of the test for differences in the levels of depression and anxiety for students by class. The results of the one-way ANOVA test did not

show statistically significant differences in the level of depression according to the class, as well as the absence of statistically significant differences in the level of anxiety according to the class.

**Table 3: One-way ANOVA test between the level of depression and anxiety with the class**

Characteristics	Depressive symptom <i>Mean score ± SD</i>	P-value	Anxiety symptom <i>Mean score ± SD</i>	P-value
<b>Class</b>				
<b>First</b>	7.16 ± 5.852	0.418	7.17 ± 5.970	0.690
<b>Second</b>	7.56 ± 6.267		7.36 ± 5.902	
<b>Third</b>	18.44 ± 6.447		7.97 ± 5.807	

*SD = Standard deviation*

**Discussion**

This cross-sectional study was performed to investigate the prevalence of depression and anxiety levels among high school female students during the COVID-19 outbreak in Medina, Saudi Arabia. According to recently published studies, COVID-19 has seen a significant rise in the prevalence of adolescent mental illness globally (14). The COVID-19 epidemic, together with its limits and effects, appears to have had a significant impact on a young age group, especially on students' mental health. These increases may have been sparked by a decrease in peer relationships, social isolation, and contact with buffering supports (such as teachers and coaches). Furthermore, schools are frequently the first place where

people go to receive psychological treatment, with 80% of kids turning to school-based services to take care of their mental health needs. Due to school closings, many children were unable to access these services. However, there has been a lot of reported variation in prevalence rates in the published international studies. High school students reported experiencing higher rates of depression, anxiety, and suicidal thoughts during COVID-19, according to studies from China and the US (15-17). The results of this study show that among high school students during the COVID-19 pandemic, the prevalence of depressive and anxious symptoms was 2.2% and 2.7%, respectively. This was lower than other published studies conducted in the Kingdom of Saudi

Arabia (18, 19). However, one study from Saudi Arabia using GAD scores indicated that Saudi Arabian Medicine students had minimal anxiety issues (20).

The variation in the studies is because of the differences in the methodological and negative emotional assessment tools (DASS tool). Peng et al. reported that the rate of depression was 16.3% and anxiety was 10.3% among high school students on the same scale during COVID-19. However, they found depression to be significant only ( $p$ -value = 0.04) while anxiety was non-significant (21). Furthermore, Liu et al. collected data from 3,836 high school students. They reported a depression prevalence rate of 13.76% and an anxiety prevalence rate of 6.73% (22). According to a study done in Jordan, issues with online learning and the educational level of their parents have an impact on senior high school students' feelings of worry and sadness. Additionally, it was discovered that older and female students experience depression and anxiety at higher rates than younger and male students. As per previous research (23), being enrolled in senior high school increases depression. Zhou et al. found significant associations with both anxiety and depression during COVID-19 (24). Older participants may find study and other similar duties increasingly important, resulting in increased anxiety during lockdowns. In addition, not being able to go outside, despite now being older, may further explain these results. Loneliness can arise from a thwarted ability to meet the needs of belongingness and social connection. During the COVID-19 pandemic, students lost interaction, lacked emotional support, and experienced social isolation. These fundamental changes are associated with loneliness, depression, and suicidal thoughts (25, 26). In our study, 10.3% had suicidal thoughts. This indicates poor mental health in female high school students. Ahmed et al. (27) found that in Saudi Arabia the risk of repeated suicide attempts among Saudi youth was high. Also, suicidal ideation was found to be higher in female adolescent students compared to male students, as per Khalid et al. (28). Current study findings and previous research point to the importance of mental health in female students.

Larger studies looking at negative emotions such as depression, anxiety, stress, and suicidal thoughts, and causing factors among high school female students across the country give a better view of the overall mental health status of female students in Saudi Arabia. We recommend a national-level survey for more generalizability of the results.

There are several methodological issues with our study. To start, the scales utilized in this investigation were not created with the intention of identifying COVID-19-related depression or anxiety. Second, it would be more interesting to investigate the students' family backgrounds and potential links to psychological status, the need for a high level of education, and the relationship between the effects of online study and mental health. To present a complete picture, future research may gather data on the socioeconomic situation, employment, parental work, and psychological well-being of the teachers. Finally, this was a cross-sectional study. In order to provide the required support, it would be preferable to monitor any changes in the psychological status of the students.

## Conclusion

A lower prevalence of depression, anxiety, and stress was reported among female high-school students during the COVID-19 pandemic. However higher suicidal thoughts observed in students highlighted their need for mental healthcare by providing psychological support programs.

## Disclosure

### *Statement*

There is no conflict of interest

### *Funding*

No funding

### *Ethical consideration*

The study was approved by the general directorate of health affairs of ministry of health in Medina, Saudi Arabia with approval number: H-03-M-084

### *Data availability*

Data that support the findings of this study are embedded within the manuscript.

### *Author contribution*

All authors contributed to conceptualizing, data drafting, collection, analysis, and final writing of the manuscript.

## References

1. Hu B, Guo H, Zhou P, Shi Z-L. Characteristics of SARS-CoV-2 and COVID-19. *Nature Reviews Microbiology*. 2021;19(3):141-54.
2. Kaur A, Bhalla V, Salahuddin M, Rahman SO, Pottou FH. COVID-19 Infection: *Epidemiology, Virology,*

- Clinical Features, Diagnosis and Pharmacological Treatment. *Current pharmaceutical design*. 2021;27(33):3551-65.
3. Elharake JA, Akbar F, Malik AA, Gilliam W, Omer SB. Mental Health Impact of COVID-19 among Children and College Students: A Systematic Review. *Child psychiatry and human development*. 2022:1-13.
4. Alkhamees AA, Alrashed SA, Alzunaydi AA, Almohimeed AS, Aljohani MS. The psychological impact of COVID-19 pandemic on the general population of Saudi Arabia. *Comprehensive psychiatry*. 2020;102:152192.
5. Son C, Hegde S, Smith A, Wang X, Sasangohar F. Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of medical internet research*. 2020;22(9):e21279.
6. Patsali ME, Mousa DV, Papadopoulou EVK, Papadopoulou KKK, Kaparounaki CK, Diakogiannis I, et al. University students' changes in mental health status and determinants of behavior during the COVID-19 lockdown in Greece. *Psychiatry research*. 2020;292:113298.
7. Lin MP. Prevalence of Internet Addiction during the COVID-19 Outbreak and Its Risk Factors among Junior High School Students in Taiwan. *International journal of environmental research and public health*. 2020;17(22).
8. Zhang MWB, Lim RBC, Lee C, Ho RCM. Prevalence of Internet Addiction in Medical Students: a Meta-analysis. *Academic psychiatry : the journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*. 2018;42(1):88-93.
9. Gao L, Gan Y, Whittal A, Lippke S. Problematic Internet Use and Perceived Quality of Life: Findings from a Cross-Sectional Study Investigating Work-Time and Leisure-Time Internet Use. *International journal of environmental research and public health*. 2020;17(11).
10. Baumann C, Rousseau H, Tarquinio C, Batt M, Tarquinio P, Lebreuilly R, et al. Effect of the COVID-19 outbreak and lockdown on mental health among post-secondary students in the Grand Est region of France: results of the PIMS-CoV19 study. *Health and quality of life outcomes*. 2021;19(1):265.
11. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*. 2001;16(9):606-13.
12. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine*. 2006;166(10):1092-7.
13. AlHadi AN, AlAteeq DA, Al-Sharif E, Bawazeer HM, Alanazi H, AlShomrani AT, et al. An arabic translation, reliability, and validation of Patient Health Questionnaire in a Saudi sample. *Annals of General Psychiatry*. 2017;16(1):32.
14. Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During COVID-19: A Meta-analysis. *JAMA Pediatrics*. 2021;175(11):1142-50.
15. Peng X, Liang S, Liu L, Cai C, Chen J, Huang A, et al. Prevalence and associated factors of depression, anxiety and suicidality among Chinese high school E-learning students during the COVID-19 lockdown. *Current Psychology*. 2022.
16. Hou TY, Mao XF, Dong W, Cai WP, Deng GH. Prevalence of and factors associated with mental health problems and suicidality among senior high school students in rural China during the COVID-19 outbreak. *Asian journal of psychiatry*. 2020;54:102305.
17. Sherry Everett Jones KAE, Marci Hertz, Sarah DeGue, Vi Donna Le, Jemekia Thornton, Connie Lim, Patricia J Dittus, Sindhura Geda,. Mental Health, Suicidality, and Connectedness Among High School Students During the COVID-19 Pandemic — Adolescent Behaviors and Experiences Survey, United States, January–June 2021. 2022;71(3):16–21.
18. Hakamy M, Ghazwani E, Bahri I. DEPRESSION, ANXIETY AND STRESS IN JIZAN CITY, KINGDOM OF SAUDI ARABIA. 2020.
19. Al-Gelban KS, Al-Amri HS, Mostafa OA. Prevalence of Depression, Anxiety and Stress as Measured by the Depression, Anxiety, and Stress Scale (DASS-42) among Secondary School Girls in Abha, Saudi Arabia. *Sultan Qaboos University medical journal*. 2009;9(2):140-7.
20. Al-Shahrani AM. Students' Anxiety during the COVID-19 Pandemic in Saudi Arabia: An Exploratory Study. *Journal of Family Medicine and Primary Care*. 2021;10(9).
21. Peng X, Liang S, Liu L, Cai C, Chen J, Huang A, et al. Prevalence and associated factors of depression,

anxiety and suicidality among Chinese high school E-learning students during the COVID-19 lockdown. *Current psychology* (New Brunswick, NJ). 2022:1-12.

22. Liu Y, Yue S, Hu X, Zhu J, Wu Z, Wang J, et al. Associations between feelings/behaviors during COVID-19 pandemic lockdown and depression/anxiety after lockdown in a sample of Chinese children and adolescents. *J Affect Disord*. 2021;284:98-103.

23. Pungpapong G, Kalayasiri R. Depression and Anxiety Plus Levels of Stress among Secondary School Students during the COVID-19 Lockdown: an Online CrossSectional Survey. *Journal of Health Science and Medical Research*; Vol 40, No 2 (2022): Mar-AprDO - 1031584/jhsmr2021824. 2022.

24. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *European child & adolescent psychiatry*. 2020;29(6):749-58.

25. Elmer T, Mepham K, Stadtfeld C. Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *PloS one*. 2020;15(7):e0236337.

26. Killgore WDS, Cloonan SA, Taylor EC, Dailey NS. Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry research*. 2020;290:113117.

27. Ahmed AE, Alaqeel M, Alasmari NA, Jradi H, Al Otaibi H, O AA, et al. Risk Assessment of Repeated Suicide Attempts Among Youth in Saudi Arabia. *Risk management and healthcare policy*. 2020;13:1633-8.

28. Al Makhallid K. The Relationship between Ideation of Suicide and Demographic Information Among Gifted High School Students of Kingdom of Saudi Arabia2022.