

## ORIGINAL PAPER

Psychiatry

# Anxiety, depression and post-traumatic stress disorder symptoms in adolescents during the COVID-19 outbreak and associated factors

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**Abstract**

**Introduction:** Outbreaks of infectious diseases have negative effects on mental health. Currently, there is very little information about the psychological effects of the COVID-19 pandemic on adolescents and associated factors affecting their mental health. The aim of the present study is to determine the severity of anxiety, depression and post-traumatic stress disorder (PTSD) symptoms in adolescents during the COVID-19 outbreak, and to investigate the associated factors with these symptoms.

**Methods:** The present study was conducted with a total of 447 adolescents. Psychiatric symptoms were evaluated by the use of DSM-5 Level 2 Anxiety Scale, DSM-5 Level 2 Depression Scale and National Stressful Events Survey PTSD Short Scale. The association between age, gender, residential area, presence of COVID-19 in the participant, presence of COVID-19 in the family or environment and psychiatric symptoms were evaluated with linear regression analysis.

**Results:** The mean age of participants was 15.06, and 38.3% of the participants were men and 61.7% were women. The rate of participants with moderate or high levels of anxiety, depression and PTSD symptoms was 28%, 37.6% and 28.5%, respectively. High age and living in an urban area were associated with increased anxiety, depression and PTSD symptoms. In addition, female gender was associated with increased depression symptoms, and the presence of COVID-19 in the family or environment was associated with increased anxiety symptoms.

**Conclusion:** The present study shows that adolescents have serious levels of anxiety, depression and PTSD symptoms during the COVID-19 pandemic. These results emphasise the need for mental health interventions that are appropriate for the characteristics of this age group.

## 1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19, also known as 2019-nCoV) was first detected in Wuhan, China, on 31 December 2019. The World Health Organization (WHO) announced COVID-19 as an international public health emergency and a pandemic.<sup>1</sup> While no

appropriate treatment is available as yet, many countries are trying to manage the COVID-19 pandemic with combinations of social isolation strategies. The growing threat of the pandemic both in Turkey and around the world as well as social isolation and overload of media information has led to an atmosphere of global anxiety and depression.<sup>2</sup> Especially due to their potential for carriage of virus,

children and adolescents under the age of 20 have been subject to social restrictions such as curfews and school closures in Turkey. However, these methods and the pandemic itself often disrupt psychosocial life, thereby creating a sense of approaching fear, which may cause mental problems.<sup>2</sup>

The WHO warns that loneliness, anxiety, depression, insomnia, harmful alcohol/drug use and self-mutilation or suicidal behaviour will increase as a result of these restrictions triggered by the serious disruptions in people's routines, separation from family and friends and social isolation.<sup>3</sup> Children and adolescents are among the most vulnerable to the effects of these restrictions; it is known that outbreaks can impair the psychological health of children and adolescents.<sup>4</sup> Previous research shows that the COVID-19 outbreak is leading to global psychiatric problems, including symptoms of anxiety, depression, post-traumatic stress disorder (PTSD), poor sleep patterns, denial, anger and fear.<sup>5,6</sup> However, most studies have been conducted with a general adult population in a wide age range; our knowledge of the effects of COVID-19 pandemic on child and adolescent mental health is very limited. In a small number of studies conducted in the adolescent age group, it was determined that the COVID-19 pandemic caused depression, anxiety disorders, PTSD and eating disorders or increased the severity of these problems that were already present before the pandemic.<sup>7-10</sup> However, these studies are limited and were mostly conducted in the Chinese population, where the outbreak was first observed. In addition, some of these studies were conducted to examine the effects of some specific restrictions (eg, home quarantine, school closure) related to the COVID-19 pandemic. There is a need for more studies conducted in different cultural populations to evaluate the psychiatric effects of the COVID-19 pandemic on adolescents.

Research on general adult populations has suggested that various factors are associated with psychiatric symptoms—female gender, young adulthood (ages 18-40), occupation (eg, migrant workers and health workers), place of residence (hardest hit or not by the epidemic), having relatives or acquaintances infected with COVID-19 and more days on lockdown.<sup>11,12</sup> Despite many studies in the adult population, there are limited studies examining factors associated with the effects of the COVID-19 outbreak on adolescent mental health. A limited number of studies conducted with adolescents have shown that female gender, living in urban areas and pandemic risk areas, the presence of COVID-19 symptoms, high anxiety for getting sick and low socioeconomic status are risk factors associated with anxiety and depression symptoms.<sup>7-10</sup> However, the risk factors identified in these adolescent studies are associated with anxiety and depression symptoms. No study has been found to evaluate the factors that may be related to PTSD, which is one of the psychiatric consequences of the COVID-19 pandemic.

Currently, our knowledge of the psychological effects of the COVID-19 pandemic on adolescents and associated risk factors is limited. Therefore, we aimed to determine the severity of anxiety, depression and PTSD symptoms in adolescents during the COVID-19 outbreak and to investigate the factors associated with these psychiatric symptoms.

### What's known

Many studies have shown that the COVID-19 outbreak leads to global psychiatric problems, and various factors are associated with these psychiatric symptoms—female gender, young adulthood (ages 18-40), occupation (eg, migrant workers and health workers), place of residence (hardest hit or not by the epidemic), having relatives or acquaintances infected with COVID-19 and more days on lockdown. However, most of studies have been conducted with a general adult population in a wide age range; our knowledge of the effects of COVID-19 pandemic on child and adolescent mental health is very limited.

### What's new

Outbreaks can impair the psychological health of adolescents. During the COVID-19 pandemic, anxiety, depression and PTSD symptoms are observed at significant rates in adolescents. Our findings provide additional information on the effects of the COVID-19 pandemic on adolescent mental health and the factors associated with these psychiatric effects.

## 2 | METHODS

This cross-sectional study was conducted online during 18-25 May 2020. Adolescents between the ages of 12 and 17 were invited to participate in the online survey with their parents' consent. Snowball sampling method was used in the study and 463 participants initially took part in the survey. After excluding the participants who stated that they had a psychiatric disorder ( $n = 16$ ), 447 participants from Malatya/Turkey were involved in the current study. In the first part of the online survey, written consent was obtained from the parents of the participants. No participant or parent received any compensation during this research. The study was approved by Malatya Clinical Research Ethics Committee on 5 May 2020 (protocol number: 2020/713).

The participants filled the demographic data form, DSM-5 Level 2 Anxiety Scale-Child (DSM-5-AS-C), DSM-5 Level 2 Depression Scale-Child (DSM-5-DS-C) and National Stressful Events Survey Post-Traumatic Stress Disorder Short Scale (NSESSS). All responses of the participants were checked and recorded by the authors.

### 2.1 | Evaluation and measurements

#### 2.1.1 | Demographic data form

This form was prepared by the researchers and consisted of seven questions. The questions were about age, gender, residential area, presence of COVID-19 in the participant, presence of COVID-19

in the family or environment, death due to COVID-19 in their family or environment and presence of psychiatric disorder before the outbreak.

### 2.1.2 | DSM-5 level 2 anxiety scale-child age 11-17

This scale is a DSM-5-dimensional scale and adapted from the Patient-Reported Outcomes Measurement Information System (PROMIS).<sup>13</sup> The scale consists of 13 items and is filled by adolescents themselves. It is a five-point Likert scale, and the responses are (a) never, (b) almost never, (c) sometimes, (d) often and (e) almost always. The items assess the severity of symptoms of anxiety disorders in the last 7 days. Higher scores reflect the presence of severe anxiety symptoms. T-scores associated with the total raw score of the individuals were shared by APA.<sup>14</sup> According to the T-score, the level of anxiety symptoms is defined as follows: Scores <55 indicate none to slight; 55-59 indicate mild; 60-69 indicate moderate; and 70 or more indicate severe.<sup>14</sup> The Turkish validity and reliability study of the scale was conducted by Sapmaz et al in 2018.<sup>15</sup> In the present study, Cronbach's alpha for the total score was 0.94.

### 2.1.3 | DSM-5 level 2 depression scale-child aged 11-17

This scale is a DSM-5-dimensional scale and adapted from the PROMIS.<sup>13</sup> The scale consists of 14 items and is filled by adolescents themselves. It is a five-point Likert scale, and the responses are (a) never, (b) almost never, (c) sometimes, (d) often and (e) almost always. The items assess the severity of symptoms of depressive disorders in the last 7 days. Higher scores reflect the presence of severe depressive symptoms. T-scores associated with the total raw score of the individuals were shared by APA.<sup>16</sup> According to the T-score, the level of anxiety symptoms is defined as follows: Scores <55 indicate none to slight; 55-59 indicate mild; 60-69 indicate moderate; and 70 or more indicate severe.<sup>16</sup> The Turkish validity and reliability study of the scale was conducted by Sapmaz et al in 2017.<sup>17</sup> In the present study, Cronbach's alpha for the total score was 0.95.

### 2.1.4 | National stressful events survey post-traumatic stress disorder short scale

The scale consists of nine items and evaluates the severity of PTSD in children aged 11-17 years after an extremely stressful event or experience.<sup>18</sup> It is a five-point Likert scale, and the responses are (a) not at all, (b) a little bit, (c) moderately, (d) quite a bit and (e) extremely. The items assess the severity of symptoms of PTSD in the last 7 days. Higher scores reflect the presence of severe PTSD symptoms. APA did not share T-scores for use in the assessment

of this scale and it is recommended to use the average total score. The average total score reduces the overall score to a five-point scale (none, mild, moderate, severe and extreme), which allows the clinician to know of the severity of the PTSD.<sup>18</sup> The Turkish validity and reliability study of the scale was conducted by Sapmaz et al in 2017.<sup>19</sup> In the present study, Cronbach's alpha for the total score was 0.90.

### 2.1.5 | Procedure

The descriptive data (age, gender, residential area, presence of COVID-19 in the participant, presence of COVID-19 in the family or environment, death due to COVID-19 in their family or environment and presence of psychiatric disorder before the outbreak) of the participants were recorded. The scores of all scales were analysed by the authors. After the database was created, participants were examined in terms of anxiety, depression and PTSD symptoms. In addition, the effects of demographic factors and data related to COVID-19 on these psychiatric symptoms were examined.

## 2.2 | Statistical analysis

SPSS 17.0 (Statistical Program for the Social Sciences) program was used for statistical analysis of the data. The quantitative data were presented as mean  $\pm$  standard deviation and minimum-maximum. The qualitative data were presented as numbers and percentages. Whether the data showed normal distribution or not was analysed with the Shapiro-Wilk normality test. Factors associated with anxiety, depression and PTSD symptoms were analysed using linear regression analysis.  $P < .05$  was considered statistically significant.

## 3 | RESULTS

### 3.1 | Demographic and descriptive characteristics

The study was completed with a total of 447 adolescents, 171 men (38.3%) and 276 women (61.7%). The mean age of participants was 15.06 years. 27.3% ( $n = 122$ ) of the participants live in rural areas and 72.7% ( $n = 325$ ) in urban areas. The participants were asked whether they, their family members or those in their environment were infected with COVID-19 and death due to COVID-19 in the family or environment. According to the answers, 3.4% ( $n = 15$ ) of the participants stated that they were infected with COVID-19 and 3.8% ( $n = 17$ ) stated that their family members or individuals in their environment were infected. None of the participants reported death due to COVID-19 in their family or environment. Descriptive data are shown in Table 1.

TABLE 1 Descriptive data

	Mean ± SD	Min-Max
Age	15.06 ± 2.00	12-17
	n	%
Gender		
Male	171	38.3
Female	276	61.7
Residential area		
Rural	122	27.3
Urban	325	72.7
Presence of COVID-19 in the participant		
Negative	432	96.6
Positive	15	3.4
Presence of COVID-19 in the family or environment		
Negative	430	96.2
Positive	17	3.8

Abbreviation: COVID-19, 2019 Coronavirus disease.

TABLE 2 Psychiatric symptoms

	Mean ± SD	Min-Max
DSM-5-AS-C	28.31 ± 12.17	13-65
DSM-5-DS-C	34.25 ± 14.09	14-70
NSESSS	10.86 ± 8.59	0-35
	n	%
Anxiety symptoms		
None to slight	267	59.7
Mild	55	12.3
Moderate	71	15.9
Severe	54	12.1
Depressive symptoms		
None to slight	220	49.2
Mild	59	13.2
Moderate	104	23.3
Severe	64	14.3
PTSD symptoms		
None	174	38.9
Mild	146	32.7
Moderate	74	16.6
Severe	49	11.0
Extreme	4	0.9

Abbreviations: DSM-5-AS-C, DSM-5 level 2 anxiety scale-child; DSM-5-DS-C, DSM-5 level 2 depression scale-child; NSESSS, National stressful events survey post-traumatic stress disorder short scale; PTSD, post-traumatic stress disorder.

### 3.2 | Anxiety, depression and posttraumatic stress disorder symptoms

The DSM-5-AS-C mean score was 28.3 (SD = 12.1), the DSM-5-DS-C mean score was 34.2 (SD = 14.0) and the NSESSS mean score was 10.8 (SD = 8.5). It was found that 40.3% (n = 180) of the participants

had anxiety symptoms, 50.8% (n = 227) had depressive symptoms and 61.1% (n = 273) had PTSD symptoms. When symptom severities were examined, it revealed that 28% of the participants had moderate or high anxiety symptoms, and this rate was 37.6% for depressive symptoms and 28.5% for PTSD symptoms (Table 2).

The effect of variables on anxiety, depression and PTSD symptoms was examined by linear regression analysis. The evaluation suggested that high age (95.0% CI = 0.09-1.21,  $P = .023$ ), urban residential area (95.0% CI = 0.68-5.71,  $P = .013$ ) and presence of COVID-19 in the family or environment (95.0% CI = 1.02-5.80,  $P = .005$ ) are associated with anxiety symptoms. For depression symptoms, high age (95.0% CI = 1.07-2.34,  $P < .001$ ), female gender (95.0% CI = 1.06-6.24,  $P = .006$ ) and urban residential area (95.0% CI = 2.94-8.58,  $P < .001$ ) were identified as an associated factor. For PTSD symptoms, high age (95.0% CI = 0.32-1.11,  $P < .001$ ) and urban residential area (95.0% CI = 1.44-4.95,  $P < .001$ ) were identified as an associated factor (Table 3).

## 4 | DISCUSSION

The first aim of the present study was to determine the frequency of symptoms of anxiety, depression and PTSD in adolescents during the COVID-19 outbreak, and it was found that the prevalence of anxiety symptoms was 40.3%, of depression symptoms was 50.8% and of PTSD symptoms was 61.1%. When symptom severities were examined, it was determined that 28% of the participants had moderate or high anxiety symptoms, and this rate was 37.6% for depressive symptoms and 28.5% for PTSD symptoms.

Previous studies in a wide age range and general population have revealed that the COVID-19 outbreak does indeed cause psychological distress and symptoms of anxiety, depression, PTSD, insomnia, denial, anger and fear.<sup>5,6</sup> Most of studies have focused on anxiety and depression. During the COVID-19 outbreak, the prevalence of anxiety was reported as between 22.6% and 36.2%, and the prevalence of depression as between 16.5% and 48.3% in the general Chinese population.<sup>11,20</sup> Despite these literature data, there are few studies examining the effects of the COVID-19 outbreak on adolescent mental health. In a self-report study conducted with 8079 adolescents aged 12-18 years in China, the prevalence of depression and anxiety symptoms during the pandemic period was found to be 43.7% and 37.4%, respectively.<sup>8</sup> Similarly, in another study conducted in China with 4805 female adolescents between the ages of 11 and 18, it was reported that 39.5% of the participants got high scores on the depression scale.<sup>9</sup> In a study conducted with 745 adolescents between the ages of 12 and 18 in Turkey, it was reported that the state anxiety scores of adolescents during the quarantine period increased 2.41 times and that the health concerns in adolescents were 58.1%.<sup>10</sup> Considering that moderate or high severity symptoms are significant in clinical practice, in the present study, the frequency of moderate or high anxiety and depression symptoms in adolescents was found to be 28% and 37.6%. Despite methodological differences, our findings are consistent

TABLE 3 Linear regression analysis for anxiety, depression and PTSD symptoms

	Anxiety symptoms			Depressive symptoms			PTSD symptoms		
	B	95.0% CI	P	B	95.0% CI	P	B	95.0% CI	P
Age	0.10	0.09-1.21	<b>.023</b>	0.24	1.07-2.34	<b>&lt;.001</b>	0.16	0.32-1.11	<b>&lt;.001</b>
Gender (0 = male; 1 = female)	0.07	-0.32-4.30	.092	0.12	1.06-6.24	<b>.006</b>	0.08	-0.12-3.10	.071
Residential area (0 = rural; 1 = urban)	0.11	0.68-5.71	<b>.013</b>	0.18	2.94-8.58	<b>&lt;.001</b>	0.16	1.44-4.95	<b>&lt;.001</b>
Presence of COVID-19 in the participant (0 = no; 1 = yes)	-0.05	-10.44-2.55	.234	-0.46	-10.86-3.70	.335	-0.08	-8.60-0.48	.080
Presence of COVID-19 in family or environment (0 = no; 1 = yes)	0.13	1.02-5.80	<b>.005</b>	0.06	-0.72-4.63	.152	0.08	-0.17-3.16	.080

Note: Bold indicates  $P < .05$ .

Abbreviations: 95% CI, 95% confidence interval (lower-upper); COVID-19, 2019 Coronavirus disease; PTSD, post-traumatic stress disorder.

with the results of previous studies conducted both in adults and adolescents.

It is known that the risk of PTSD increases in times of pandemics as well as in disasters.<sup>21</sup> Previous studies on COVID-19 have reported the prevalence of PTSD as between 5% and 31.8%.<sup>22-24</sup> However, these studies were conducted in the general adult population, and there is no study in the literature examining the relationship between the COVID-19 outbreak and PTSD symptoms in adolescents. Studies on past outbreaks reveal that PTSD is observed at a serious rate of 30% in children.<sup>25</sup> In the present study, 28.5% of the adolescents had moderate or high PTSD symptoms, and it is consistent with the literature on past outbreaks and some studies on COVID-19 pandemic in adults.

Furthermore, the largest and most comprehensive epidemiological studies conducted to determine the prevalence of psychopathology in childhood and adolescence in Turkey found the overall prevalence of any mental disorder to be 37.6%. These data belong to the prepandemic period and the prevalence of mood disorder is reported as 2.5%, anxiety disorder as 16.7% and PTSD as 0.4%.<sup>26</sup> The findings of our study show that adolescents develop more symptoms of depression, anxiety and PTSD during the COVID-19 pandemic period than prepandemic period. The occurrence of moderate- to high-level symptoms severity observed in adolescents at serious rates shows that substantial efforts should be made to carry out detailed clinical evaluations of the symptoms and take protective measures against them.

The second aim of the present study was to investigate the associated factors with anxiety, depression and PTSD symptoms. The results showed that high age and living in an urban area were associated with increased anxiety, depression and PTSD symptoms. In addition, a significant relationship was found between female gender and depression symptoms, and between the presence of COVID-19 in the family or environment and anxiety symptoms.

The gender-related findings of the present study are partially consistent with the previous research. Previous studies examining the effects of outbreaks on mental health in children and adults have suggested that female gender is a potential risk factor for anxiety

and depression symptoms.<sup>11,12</sup> Similarly, epidemiological studies carried out in the nonpandemic period revealed that anxiety disorder and depressive disorder were higher in women than in men.<sup>27,28</sup> Consistent with the literature, the present study showed that there is a significant association between female gender and depressive disorder symptoms. Although anxiety and PTSD symptoms are higher in women than men, the relationship between female gender and anxiety and PTSD symptoms is not significant. Such as gender, our age-related findings are also partially consistent with the literature. During the COVID-19 pandemic, Chen et al reported that the elder adolescents were more depressed than the younger ones and there was no significant difference in anxiety among age groups.<sup>29</sup> However, more consistent with our findings, Zhou et al reported that the risk of anxiety and depression increased with age in the adolescent period.<sup>8</sup>

Previous studies examining the relationship between residential area and psychiatric symptoms during the COVID-19 pandemic have classified and examined residential areas according to the incidence of the disease (hardest hit or not by the pandemic). However, in the present study, a classification was made according to the type of residential area (rural or urban), not the level of incidence of the disease. The results of the present study showed that there is a significant relationship between living in urban areas during the pandemic period and symptoms of anxiety, depression and PTSD. The population density in urban areas is higher than in rural areas. It is known that the number of patients with COVID-19 is higher in urban areas than in rural areas due to the impact of population density, and restrictions are greater and more comprehensive in urban areas than in rural areas. We think all of these reasons could explain the relationship between living in an urban area and anxiety, depression and PTSD symptoms.

As expected, the presence of COVID-19 in the family or environment was determined as an associated factor with anxiety symptoms in this study. However, contrary to expectations, the presence of COVID-19 in the family or environment was not associated with depression and PTSD symptoms, and the presence of COVID-19 in the participant was not associated with anxiety, depression and

PTSD symptoms. As the authors, we think this result is due to the small number of infected participants and family or environment members. In addition, this result can be interpreted by the ending of the uncertainty of children about the pandemic. In the early stages of pandemics, there is a widespread uncertainty about the odds and seriousness of becoming infected.<sup>4</sup> Uncertainty regarded as a powerful stressor and is a risk factor for many psychiatric problems.<sup>30</sup> Ending uncertainty in some way can reduce psychiatric symptoms. Additionally, this study revealed that the presence of COVID-19 in the family or environment was a potential risk factor for anxiety symptoms. In pandemics, people have fears and worries that they or their loved ones will become infected and die. The appearance of the infection in people in the immediate vicinity may increase these fears and anxieties, causing symptoms of anxiety.

In this study, no investigation was conducted to determine the causes of psychiatric problems associated with the COVID-19 outbreak. However, as the authors, we think that the unique characteristics of adolescence and various factors may be related to psychiatric problems. Stressful life events are strong negative environmental factors that can predispose individuals to psychiatric disorders, and COVID-19 outbreak can be considered a stressful life event due to its negative effects all over the world.<sup>1,31-33</sup> All age groups are sensitive to stressful events but adolescents are particularly vulnerable.<sup>34</sup> Adolescence is an important period when young people develop their self-concept, search for identity and interpret themselves and the environment.<sup>35-38</sup> In this period, self-concept is central to positive psychological outcomes and can be influenced by social factors and stressful events.<sup>39-41</sup> Therefore, experiencing stressful life events during this period of development may result in vulnerability to psychiatric problems.<sup>42</sup> In addition, previous studies suggested that high anxiety about the pandemic, fear of being infected or dying, fear of losing relatives, uncertainty about the pandemic process, social media shares and media reports (text and images), negative and pessimistic information (rumours), restrictions, social isolation and stress were associated with psychiatric problems.<sup>4,7,10,43,44</sup> Studies on the causes of the psychological effects of both past pandemics and the current COVID-19 pandemic are limited and studies are needed to determine the underlying causes.

The results of the present study are important due to limited data in literature regarding the mental problems that adolescents in the age group of 12-17 may experience during the pandemic period. In addition, the relatively high number of participants in the study makes our findings valuable. However, as with all research, this study has several limitations. The most important limitation of this study is its cross-sectional design. Therefore, the long-term mental effects of the COVID-19 pandemic cannot be predicted with these results, and the present results cannot be generalised. Previous longitudinal studies show that adverse life events such as pandemics or disasters such as earthquakes cause more psychiatric problems than expected.<sup>45,46</sup> In addition, the timing of the study may also have an impact on the results. While screening made in the early period of pandemic detects symptoms similar to acute stress response, mental problems such as burnout and depression may be expected more in

the prolonged period. Indeed, the fact that the same sample group was not screened at different periods of the pandemic can be considered as another limitation of the study. The other limitations of this study are that the number of female participants is much higher than the number of male participants, the questionnaires were filled in online, clinical interviews were not conducted with the participants and the questionnaires sought only to screen the symptoms.

In conclusion, the present study shows that adolescents have serious levels of anxiety, depression and PTSD symptoms during the COVID-19 pandemic. These results emphasise the need for mental health interventions that are appropriate for the characteristics of this age group. Future research should go beyond its cross-sectional design to investigate other factors affecting adolescents' mental health in emergency public health situations such as pandemics. Although the effects of COVID-19 on mental health have not been systematically investigated, the limited studies conducted may be expected to have significant effects based on their observations. These observations demonstrate the need for mental health professionals and psychological support systems to reduce the psychosocial outcomes of the COVID-19 pandemic with teams of psychiatrists and psychologists.

## DISCLOSURES

The authors have declared no disclosures.

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