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The Effect of Social Support on Mental Health in Chinese Adolescents During the Outbreak of COVID-19

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A B S T R A C T

Purpose: The coronavirus disease 2019 (COVID-19) outbreak impacts physical and mental health. The purpose of this study was to explore the association between the levels of social support and mental health among Chinese adolescents during the outbreak.
Methods: A total of 7,202 adolescents aged 14–18 years completed online surveys from March 8 to 15, 2020, in China. Researchers assessed the associations between depression symptoms (Patient Health Questionnaire-9), anxiety symptoms (Chinese version of the 7-item Generalized Anxiety Disorder scale), and social support (Social Support Rate Scale).
Results: COVID-19 exposure was associated with a higher prevalence of depression symptoms (odds ratio [OR] = 1.38, 95% confidence interval [CI]: 1.14–1.66) and anxiety symptoms (OR = 1.26, 95% CI: 1.04–1.52). Only 24.6% of adolescents reported high levels of social support. Most adolescents (70%) reported medium levels of support, and 5.4% reported low support. Low support was associated with higher prevalence of depression (OR = 4.24, 95% CI: 3.38–5.33) and anxiety symptoms (OR = 3.18, 95% CI: 2.54–3.98), while controlling for gender, grade, living situation, and COVID-19 exposure; similarly, medium support was associated with higher prevalence of depression (OR = 2.79, 95% CI: 2.48–3.15) and anxiety (OR = 2.19, 95% CI: 1.94–2.48) symptoms.
Conclusions: This study indicates there is a higher prevalence of mental health problems among adolescents with medium and low levels of social support in China during the outbreak of COVID-19.

IMPLICATIONS AND CONTRIBUTION

There is a higher prevalence of mental health problems among adolescents with medium and low levels of social support in China during the coronavirus disease 2019 outbreak.

The coronavirus disease 2019 (COVID-19) has been listed as a public health emergency of international concern by the World Health Organization [1]. Studies have shown that people who are exposed to persistent risk and uncertainty of infectious diseases typically suffer greater rates of depression, anxiety, panic attack symptoms, or other mental health problems, including suicide [2]. Therefore, COVID-19 is expected to pose a challenge to people's psychological endurance, and societies around the globe urgently need to understand the mental health status of their populations over time [3].

Adolescence is a transitional and critical developmental period in humans that is characterized by brain and body maturation, increased socialization, improvements in abilities, and the transition to independence [4]. During this period, poor mental health can compromise adolescents' development and future potential [5]. In recent years, a high prevalence of

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depression and anxiety symptoms has been reported worldwide, and there is increasing concern about the mental health of adolescents [6,7]. Previous studies have shown that adolescents are more vulnerable to traumatic and stressful events and are prone to developing mental health problems when faced with such events [8]. COVID-19 has become a stressor to this population. The disease is a new viral infection that, at present, cannot be prevented with a vaccine and can only be treated symptomatically. Because of the high infectious potential and mortality rate of the disease, the incidence of depression and anxiety among adolescents is also likely to be high. Therefore, more attention to the mental health of adolescents is needed during such a crisis.

Social support is one of the most common concepts in the trauma literature. Generally speaking, social support can be divided into two categories. One category is objective support, including direct material aid, the existence of social networks, and community relations and participation. Another category is subjective support, which refers to individual respect and understanding of emotional experience and satisfaction, and is closely related to the individual's subjective feeling. In addition, some scholars believe that social support should also include the individual's use of support [9,10].

Research shows that social support is related to people's mental health. Social support can help relieve or buffer the anxiety symptoms of individuals in the face of stress, thus reducing the symptoms of insomnia [11,12]. Studies have found that levels of social support are closely related to incidence of depression and anxiety, that low levels of social support are more likely to lead to depression and anxiety symptoms when individuals are exposed to stress [13,14], and that social support can be a valuable predictor of mental health status [15]. Thus, it is reasonable to hypothesize that higher levels of social support could aid the mental health of adolescents who experienced the outbreak of COVID-19. The objective of our study was to estimate the prevalence of depression and anxiety symptoms in high school students during the COVID-19 epidemic in China and to evaluate whether social support and sociodemographic factors were related to mental health.

Methods

Subjects and sampling

We conducted this cross-sectional study using an online survey to assess mental health problems from March 8 to March 15, 2020. The questionnaire was distributed to the WeChat groups of junior high school (JHS) and senior high school (SHS) students who come from 21 provinces and autonomous regions through the Wenjuanxing platform https://www.wjx.cn/app/survey.aspx. It took about 10 minutes to complete a questionnaire online. The inclusion criteria for participants were as follows: (1) JHS and SHS students; (2) can read and understand the Chinese questionnaire; (3) WeChat users or QQ users; (4) volunteer to participate in the survey; and (5) submitted only one survey using the same IP address. First, we contacted the headteacher of JHS students and SHS students, and then the headteacher sent questionnaires to the WeChat group or QQ group of the class through the Wenjuanxing platform. A total of 7,383 students were invited to participate in the online survey; 7,202 fulfilled the study inclusion criteria and completed the assessments, giving a response rate of 97.5%. All participants and their guardians signed the informed consent statement online, which were mainly conducted in the form of online consent explanations. All subjects completed the questionnaires voluntarily and anonymously, and they did not receive any reward. This study was approved by the Institutional Review Board of Beijing Huilongguan Hospital.

Measures

Sociodemographic information included adolescent gender, grade level (JHS or SHS), whether adolescent living with parents or not, and whether hometown was urban or rural. The criteria for determining an individual's exposure to COVID-19 include whether the adolescent had been in compulsory isolation or under medical observation because they were diagnosed with COVID-19 or had a history of close contact with COVID-19 infection person. Close contact was defined as having lived with a confirmed or suspected COVID-19 infected person; having contact within 2 days before the onset of symptoms in suspected and confirmed cases; or persons who do not take effective protection and have close contact with asymptomatic infected persons (before 2 days COVID-19 nucleic acid sampling testing) within 1 m [16].

Depression was assessed by the Patient Health Questionnaire (PHQ-9), a validated measure of major depressive disorder based on DSM-IV criteria including nine items [17]. Each question had four possible responses (from 0 to 3), and the total score could range from 0 to 27. The severity of depression was characterized as none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe ($\geq$20). We categorized adolescents with the PHQ-9 scores $\geq$5 as having depression symptoms.

Anxiety was assessed by the 7-item Generalized Anxiety Disorder (GAD-7), a self-assessment tool screening for generalized anxiety and symptom severity in DSM-IV [18]. Each question had four possible responses (from 0 to 3), and the total score could range from 0 to 21. The severity of anxiety symptoms was classified as none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), , moderate and severe and severe ($\geq$15). We categorized adolescents with the GAD-7 scores $\geq$5 as having anxiety symptoms.

Social support was assessed by the Social Support Rate Scale (SSRS), which includes 10 items and is one of the most used instruments for measuring the levels of social support [19]. The higher the score, the higher the level of social support. The scores for low-level social support, medium-level social support, and high-level social support were 0–22, 23–44, and 45–66, respectively.

Statistical analysis

The dataset was analyzed using SPSS version 24.0 (IBM SPSS, IBM Corp., Armonk, NY). First, we conducted a descriptive statistical analysis. Second, we assessed associations between demographic data, COVID-19 exposure, SSRS scores, and scores for PHQ-9 and GAD-7 scores; chi-square tests were used to analyze categorical variables; and Spearman correlation analyses were used to examine the relationship between the scores of PHQ-9, GAD-7, and SSRS. Finally, binary multivariate logistic regression analyses were used to explore the association between the predictors of depression and anxiety symptoms. The presence of depressive symptoms (no = 0; yes = 1) was the dependent variable. Gender (male = 1; female = 2), grade (JHS = 1; SHS = 2), whether you live with your parents (yes = 0; no = 1), whether

there is COVID-19 exposure (no = 0, yes = 1), and social support level (high level = 1, medium level = 2, and low level = 3) were the independent variables. Variables were entered using the conditional stepwise method, and binary multivariate logistic regression analysis was carried out. Anxiety symptoms were predicted using the same method. The level of significances was set at $p < .05$ (two sided) for all statistical analyses.

Results

As shown in Table 1, 7,202 students participated in the survey. Of the participants, 3,343 (46.4%) were male, 3,120 (53.6%) were JHS students, 6,840 (95.0%) were living with their parents, and 4,581 (63.6%) were from rural areas. The median age was 16.0 years (interquartile range [IQR] = 2.0, range 14.0–18.0).

Of participants, only 471 (6.5%) reported possible exposure to COVID-19. The levels of social support were reported as high by 1,769 (24.6%), medium by 5,040 (70%), and low by 393 participants (5.4%); the median score on the SSRS was 38.0 (IQR = 13.0, range 6.0–66.0). Approximately one-half (44.5%) self-reported depression symptoms (median score on the PHQ-9 was 4 [IQR = 8.0, range 0–27.0]), and 38.0% self-reported anxiety symptoms (median score on the GAD-7 was 3 [IQR = 7.0, range 0–21.0]).

The differences in the prevalence of depression and anxiety symptoms between females and males and between JHS and SHS students were statistically significant (Table 1). The prevalence of depression and anxiety symptoms among rural residents was significantly higher than urban residents. There was a statistically significant higher prevalence of anxiety symptoms of individuals living with others compared with those living with their parents. The prevalence of depression and anxiety symptoms was higher for adolescents who reported exposure to COVID-19 than those without COVID-19 exposure.

Both the PHQ-9 scores and the GAD-7 scores showed a significant negative correlation with the SSRS scores (r = −.305, $p < .001$; r = −.214, $p < .001$; Table 1). The difference in the prevalence of depression and anxiety symptoms among adolescents with different levels of social support was statistically significant. The lower level of social support, the higher rate of depression and anxiety symptoms. Furthermore, there was significant difference among the three groups respectively.

Table 2 presents the results of multivariable logistic regression analyses. Female gender (odds ratio [OR] = 1.17, 95% confidence interval [CI]: 1.07–1.29), SHS grade (OR = 1.47, 95% CI: 1.34–1.62), rural resident (OR = 1.46, 95% CI: 1.33–1.61), COVID-19 exposure (OR = 1.38, 95% CI:1.14–1.66), low social support (OR = 4.24, 95% CI: 3.38–5.33), and medium social support (OR = 2.79, 95% CI: 2.48–3.15) were independently and significantly associated with higher risk of depressive symptoms. Female gender (OR = 1.12, 95% CI: 1.02–1.23), SHS grade (OR = 1.23, 95% CI: 1.12–1.35), not living with parents (OR = 1.33, CI: 1.07–1.64), rural resident (OR = 1.38, 95% CI: 1.25–1.53), COVID-19 exposure (OR = 1.26, 95% CI: 1.04–1.52), low social support (OR = 3.18, 95% CI: 2.54–3.98), and medium social support (OR = 2.19, 95% CI: 1.94–2.48) were also independently and significantly associated with higher risk of anxiety symptoms.

Table 1
Prevalence of depression and anxiety symptoms by social support and demographic characteristics (N = 7,202)

Variables	n	%	Depression			Anxiety		
			n	%	*p*	n	%	*p*
Gender					.001			.022
Male	3,343	46.4	1,418	42.4		1,223	36.6	
Female	3,859	53.6	1,789	46.4		1,513	39.2	
Grade					< .001			< .001
JHS	3,120	43.4	1,221	39.1		1,101	35.3	
SHS	4,082	56.7	1,986	48.7		1,636	40.1	
Living with parents					.086			.009
Yes	6,840	95.0	3,030	44.3		2,575	37.6	
No	362	5.0	177	48.9		161	44.5	
COVID-19 exposure					.001			.018
Yes	471	6.5	245	52.0		203	43.1	
No	6,731	93.5	2,962	44.0		2,533	37.6	
Hometown					< .001			< .001
Urban resident	2,621	36.4	1,012	38.6		871	33.2	
Rural resident	4,581	63.6	2,195	47.9		1,865	40.7	
Social support					<.001			<.001
High	1,769	24.6	463	26.2		435	24.6	
Medium	5,040	70.0	2,508	49.8[a]		2,101	41.7[a]	
Low	393	5.4	236	60.1[a,b]		200	50.9[a,b]	
Total	7,202							

COVID-19 = coronavirus disease 2019; JHS = junior high school; SHS = senior high school.
[a] Compared with high social support, $p < .001$.
[b] Compared with medium social support, $p < .001$.

Discussion

To our knowledge, this study was the first to examine the levels of social support and its relationship with mental health in adolescents during the outbreak of COVID-19. There are three main findings in this large-scale, cross-sectional online study. First, we found that the prevalence of at least mild depression and anxiety symptoms in Chinese adolescents aged 14–18 years was 44.5% and 38.0%, respectively. The prevalence of similar levels of symptoms before COVID-19 is not known. Previous studies using higher cutoffs on measurement scales have shown the prevalence of depression as about 24.3% and 22% for anxiety [20–22]. Second, sociodemographic variables, such as gender, living circumstances, and personal COVID-19 exposure, were related to increased risk of depression and anxiety symptoms. Third, and most importantly, varying levels of social support significantly correlated with varying rates of depression and anxiety symptoms.

Many factors may be influencing adolescent mental health. During our study, the COVID-19 epidemic has continued to spread worldwide. Possible COVID-19 exposure, like many infectious diseases, may increase adolescents' fear of illness and death [23,24]. Moreover, because of the COVID-19 outbreak, schools have been closed, adolescents have had to live and study at home, and communication with others has been impacted, which also can have a negative impact on mental health [25]. In addition, most entertainment and activity venues have been closed, so adolescents have to stay at home, and they are less physically active than before. It has been shown that staying at home for a long time and a lack of sports availability also increases the risk of depression in adolescents [26]. At the same time, the indefinite closure of schools, the uncertainty of academic development, and additional potential negative factors also cause negative impacts on adolescents' mental health [27].

Consistent with a previous study [28], our results showed that females reported a higher prevalence of depression and anxiety

Table 2
Binary multivariate logistic regression analysis of influencing factors of depressive symptoms and anxiety symptoms in adolescents (N = 7,202)

Variables	Depression symptoms			Anxiety symptoms		
	OR	95% CI	*p*	OR	95% CI	*p*
Gender						
Male	1			1		
Female	1.17	1.07–1.29	.001	1.12	1.02–1.23	.022
Grade levels						
JHS	1			1		
SHS	1.47	1.34–1.62	<.001	1.23	1.12–1.35	<.001
Living with parents						
Yes	1			1		
No	1.20	.97–1.49	.087	1.33	1.07–1.64	.009
Hometown						
Urban resident	1			1		
Rural resident	1.46	1.33–1.61	<.001	1.38	1.25–1.53	<.001
COVID-19 exposure						
No	1			1		
Yes	1.38	1.14–1.66	.001	1.26	1.04–1.52	.018
Social support						
High	1			1		
Medium	2.79	2.48–3.15	<.001	2.19	1.94–2.48	<.001
Low	4.24	3.38–5.33	<.001	3.18	2.54–3.98	<.001

CI =confidence interval; COVID-19, coronavirus disease 2019; JHS = junior high school; OR = odds ratio; SHS = senior high school.

than males. [28]. We found that as students progressed to a higher grade, the rates of depression and anxiety increased substantially, which is consistent with the findings from several meta-analyses [20,29]. SHS students typically perceive more pressure to succeed and must adapt to new academic workloads, school expectations, and social relationships. Thus, they are especially prone to experiencing anxiety and depression [30–32]. Moreover, our findings suggested that being a rural resident, which may relate to a lower level of family income, was a risk factor for depression and anxiety [33].

Social support providers in the study included family members, friends, and significant others. Previous studies showed that sources of support vary across life periods, with parental support being most important during the adolescent life period [34,35]. In our study, 95% of the subjects lived with their parents. This is important because evidence has been emerging that parental support could effectively alleviate the anxiety of adolescents [36]. For adolescents who do not live with their parents, their parents may work in other places, and most of them are left-behind high school students. They have to live with their grandparents or other relatives. But research shows that left-behind high school students typically pay more attention to their academic achievements and sustain more academic pressure, which also increases their anxiety [37]. In the present study, although most of the adolescents who stayed at home lived with their parents, just 24.6% of the subjects in the study reported a high level of social support. A possible reason for this low number is that a family system may not provide enough social support because of family dysfunction (e.g., a family may have poor problem-solving strategies or suffer from ineffective communications among family members) [38].

In the present study, we found a negative correlation between the levels of social support and the severity of depression and anxiety symptoms. Moreover, more than half of the adolescents with low social support experienced depression and anxiety symptoms. Multivariate logistic regression analysis revealed that adolescents with low social support showed 4.2 times greater risk of depression symptoms and 3.2 times greater risk of anxiety symptoms than those with high social support. Notably, our results are in general agreement with prior studies that examined social support and mental health in adolescents [34,39,40], especially during a catastrophic stressor, such as a tornado [41] or earthquake [42]. These findings indicate that social support is a significant important protective factor for mental health among adolescents. The more social support adolescents receive, the better their mental status. A possible reason is that family members or friends reduce anxiety and depression levels of adolescents by sharing empathy with them [11]. Social support also improves an individual's sense of self-efficacy and leads to more understanding, respect, encouragement, courage, and self-fulfillment, all of which can help an individual maintain relatively stable emotions even under pressure [43].

There are some limitations to the present study. The first is that the study focused on students in specific areas of China and does not include adolescents aged <14 years, which may impact sample representativeness. Second, this study uses self-report measures. Finally, this is a cross-sectional survey, limiting our ability to make statements about causal relationships. It is necessary to conduct further prospective and longitudinal studies to assess the levels of mental health and social support at different points in the future within the context of COVID-19.

In conclusion, during the outbreak of COVID-19, the prevalence of depression and anxiety symptoms in the Chinese adolescents who took part in the study was relatively high, and social support was a protective factor for the mental health of the adolescents. Our findings provide evidence supporting the implementation of strategies to increase the social support of adolescents during the COVID-19 epidemic. For example, psychologists and social workers should take the initiative to provide psychological assistance and individually target interventions for adolescents with depression and anxiety. Efforts should also be made to encourage the availability of other types of social support to promote mental health in adolescents who are experiencing the outbreak of COVID-19.

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Authors' contributions: M.Q. and S.-J.Z. were involved in interpretation of data and drafted the article. J.-X.C. conceived and designed the study and did statistical analysis. Q.M., S.-J.Z., Z.-C.G., L.-G.Z., H.-J.M., and X.-M.L. contributed to data acquisition. All the authors have revised the manuscript for important intellectual content and have read and approved the final article.

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