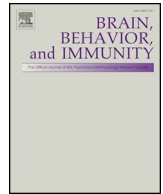




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Letter to the Editor

Depression and anxiety among adolescents during COVID-19: A cross-sectional study



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Dear Editor,

The novel coronavirus disease 2019 (COVID-19), a hideous pandemic disease outbreaking in 2019, has swept extensive regions around the world. Recent studies have shown different levels of psychological distress among people differently exposed to the COVID-19 epidemic (Wang et al., 2020; Zhang et al., 2020). Adolescents, a vulnerable population, have been carrying on their school curriculums online and conducting daily activities indoors since the outbreak of COVID-19 in China. This life-style transformation and threat of being infected may cause depressive and anxious disorders. Without appropriate psychological interventions, depression and anxiety among adolescents often persist into adulthood and elevate the risk factors of age-related disease, such as cardiovascular disease (Danese et al., 2009; Jones, 2013). However, the direct evidence that reflected depression and anxiety among adolescents during COVID-19 was blank. In this study, we filled this gap through an online questionnaire.

Due to the quarantine management, the online questionnaire comprising Depression Self-Rating Scale for Children (DSRS-C, Cronbach's $\alpha = 0.73$), Screen for Child Anxiety Related Disorders (SCARED, Cronbach's $\alpha = 0.43$ –0.89) and some basic demographic characteristics was issued and gathered by a mobile application called “Sojump” (www.sojump.com). This questionnaire was accessible from April 16, 2020 to April 23, 2020 for adolescents in Guiyang, China. Finally, a total of 1109 individuals filled in the questionnaire, in which 1036 questionnaires met the admittance criterion for subsequent analysis.

For DSRS-C, the minimum score used to identify depression is 15, while the minimum score used to identify anxiety by SCARED is 25. According to this guidance, 112 (11.78%) cases with depression and 196 (18.92%) cases with anxiety were identified, and 68 (6.56%) cases presented both depression and anxiety. Logistic regression analysis was conducted following single-factor analysis for 10 potentially relevant factors (Table 1). Logistic regression suggested that gender, age, educational of parents, companion on weekdays and physical exercise were associated with depression sig-

Table 1

The characteristics for each factor and the statistical result.

Factors	Cases count (All)	Cases count (Depression)	Cases count (without depression)	Percentage of depression(%)	p-value	Cases count (Anxiety)	Cases counts (without anxiety)	Percentage of anxiety(%)	p-value
Gender					0.005 ^a				0.009 ^a
Male	531	48	483	9.04		84	447	15.82	
Female	505	74	431	14.65		112	393	22.18	
Age					0.003 ^a				0.001 ^a
Group 1 (6–8 years old)	343	11	332	3.21		43	300	12.54	
Group 2 (9–12 years old)	310	30	280	9.68		63	247	20.32	
Group 3 (13–15 years old)	383	81	302	21.15		90	293	23.50	
Educational level of father					< 0.001 ^a				0.003 ^a
L: Primary education level and below	60	8	52	13.33		11	49	18.33	
M: Secondary education level	374	74	300	19.79		91	283	24.33	
H: University education level and above	602	40	562	6.64		94	508	15.61	
Educational level of mother					< 0.001 ^a				0.003 ^a
L: Primary education level and below	95	32	63	33.68		21	74	22.11	
M: Secondary education level	360	57	303	15.83		86	274	23.89	
H: University education level and above	581	33	548	5.68		89	492	15.32	

(continued on next page)

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Table 1 (continued)

Factors	Cases count (All)	Cases count (Depression)	Cases count (without depression)	Percentage of depression(%)	p-value	Cases count (Anxiety)	Cases counts (without anxiety)	Percentage of anxiety(%)	p-value
Medical staff in parents					0.624				0.484
Yes	58	8	50	13.79		13	45	22.41	
No	978	144	834	14.72		183	795	18.71	
Only child					0.029 ^a				0.317
Yes	327	28	299	8.56		56	271	17.13	
No	709	94	615	13.26		140	569	19.75	
Regular physical exercise					< 0.001 ^a				< 0.001 ^a
Yes	835	78	757	9.34		134	701	16.05	
No	201	44	157	21.89		62	139	30.85	
Electronic entertainment					0.001 ^a				< 0.001 ^a
Yes	375	60	315	16.00		104	271	27.73	
No	661	62	599	9.38		92	569	13.92	
Confirmed cases in community					0.052				0.017 ^a
Yes	22	6	16	27.27		9	13	40.91	
No	1014	116	898	11.44		187	827	18.44	
Being accompanied on workday					< 0.001 ^a				0.003 ^a
Yes	835	77	758	9.22		143	692	17.13	
No	201	45	156	22.39		53	148	26.37	

^a p < 0.05, Chi-square test.

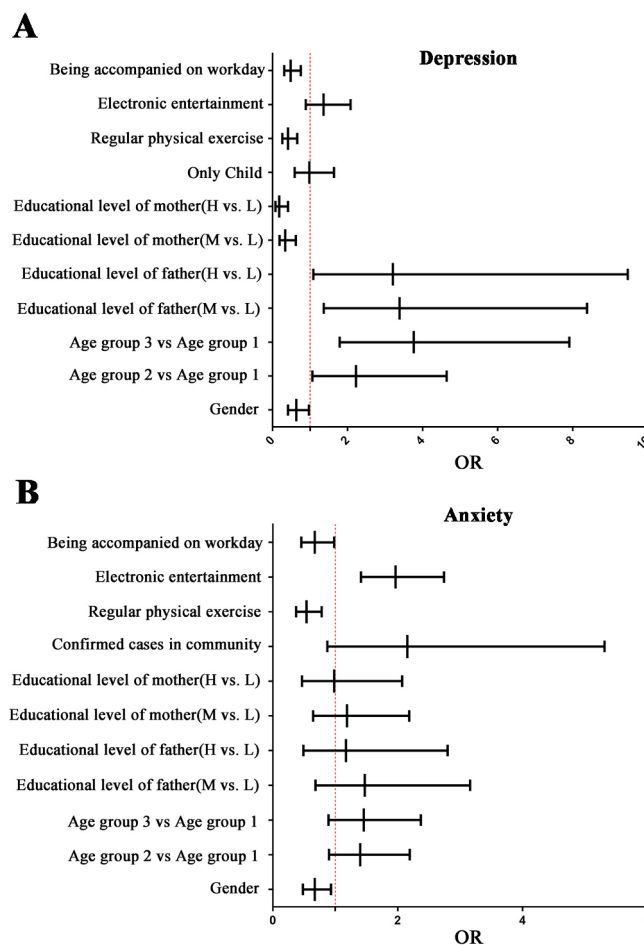


Fig. 1. Logistic regression of relevant factors for depression and anxiety. A. Summary relevant factors for depression. B. Summary relevant factors for anxiety. The horizontal lines correspond to the study-specific 95% CIs. The vertical lines on both sides showed the two boundaries of 95% CI. The vertical line in the middle indicated the OR value for each comparison. The red and discontinuous line indicated the site of OR = 1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

nificantly, and that gender, physical exercise and companion on weekdays were associated with anxiety significantly (Fig. 1).

Consistent with previous studies, the female adolescents showed higher risk of depression and anxiety during COVID-19. The elder adolescents, in our sample, were more depressed than the younger ones. However, no association was detected with anxiety when it came to different age groups. There is a common phenomenon that children are left at home on weekdays without any companion. Our data indicated that adolescents without companion on workdays were more likely to be depressed and anxious during COVID-19. Without surprise, physical exercise was associated with both depression and anxiety and showed some protective effect for adolescent mental health during this global public health emergency (Chekroud et al., 2018).

When it comes to psychological problems, prevention and early identification exceed treatment. We call for more attention to the mental health of female adolescents, more companion for the left-home adolescents and more physical exercise for all adolescents, during COVID-19. We believe this study will provide guidance to teachers, psychologists and political leaders for timely and effective intervention targeting mental health of adolescents.

1. Compliance with ethical standards

All procedures in this study have been approved by ethics committee of The Second Affiliated Hospital of Guizhou University of Traditional Chinese Medicine.

2. Funding sources

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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