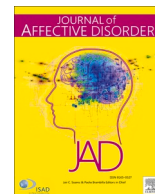




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Research paper

Is returning to school during the COVID-19 pandemic stressful? A study on immediate mental health status of Chinese college students

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ABSTRACT

Background: As the COVID-19 pandemic has posed substantial impacts on individual's daily routine and psychological state. For the first time at great scale, Chinese college students had their educational activities moved online in spring 2020. Due to this unexpected isolation and unconventional learning method, their mental health following returning to school is worth investigating.

Methods: Between June 1 and June 15, 2020, a total of 8,921 returning college students' mental health status were assessed using instruments designed for psychiatric disorders, namely the 9-Item Patient Health Questionnaire (PHQ-9), 7-Item Generalized Anxiety Disorder Scale (GAD-7), 6-Item Impact of Event Scale (IES-6), Youth Self Rating Insomnia Scale (YSIS), and self-developed questionnaire.

Results: Our results showed that 8.7%, 4.2%, 10.5%, and 6.1% of the participants experienced depression, anxiety, acute stress, and insomnia, respectively, with a total of 19.8% reporting having at least one psychiatric symptom following their return to school. Sophomore and Senior year, and presence of previous psychiatric conditions contribute to the increased occurrence of psychiatric issues. The level of impact by COVID-19 on one's daily functioning is also positively associated with poor mental health.

Conclusions: Our findings suggested no significant increase in the prevalence of psychiatric symptoms, following the first batch of students' return to school. These findings aim to complement the current understanding of the psychiatric impact of COVID-19 on students and assist school principals to plan their return-to-school approaches in a mental-health sensitive way.

1. Introduction

COVID-19 was shown to have pervasive impacts on individuals' mental health, leading to psychiatric conditions such as depression and anxiety among infected patients (Bo et al., 2020), frontline healthcare workers (Lai et al., 2020), and public (Luo et al., 2020). Unlike other natural disasters or man-made traumatic events, the COVID-19 pandemic has been a continuing crisis, which may lead to variations in symptom trajectory at different stages of the pandemic.

Recent studies have showed that college students have experienced considerable degree of psychological distress since the start of COVID-19 in early 2020 (Wang et al., 2020a). Such phenomenon might be related to voluntary self-quarantine widely adopted across China after the outbreak was publicized. Based on previous studies, the length of duration spent in self-isolation and social restrictions would increase individual's vulnerability to psychological distress (Reynolds et al., 2008). In addition, as most campuses were closed during the early stage of the pandemic, students needed to study from home (Bedford et al.,

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2020), which limited their opportunities for interpersonal communication, fed into feelings of loneliness and in turn, resulted in mental health issues (Sahu, 2020). For example, a recent study in China found that more than one fifth college students reported anxiety symptoms during the COVID-19 outbreak (Cao et al., 2020). Similar studies showed that 43.7% of Chinese high school students exhibited depressive symptoms, 37.4% had anxiety symptoms, and 31.3% had co-occurring depressive and anxiety symptoms during the COVID-19 outbreak (Zhou et al., 2020a).

China has achieved great success in controlling the COVID-19 pandemic since late April 8, 2020. Starting from the beginning of May, there has been very low newly confirmed cases per day, with a clear downward trend nationwide (The State Council Information Office of the People's Republic of China, 2020). As a result, many colleges/universities started to re-open and allowed students to return to school in batches. Previous study looking at Chinese workforce found that returning to work had not caused higher level of mental health problems during COVID-19 (Tan et al., 2020). However, in the younger student group, their mental health status after returning to school remains unclear.

Therefore, we conducted this study to explore the prevalence and severity of psychiatric symptoms as well as related influential factors in the first batch of college students who returned to school in Guangzhou, China from June 1st to June 15th 2020. Real-time data showed that as of 24:00 on June 1, 2020, Guangdong Province has reported a total of 1596 confirmed cases of COVID-19 (201 imported cases from abroad). Therefore, Guangdong was a moderate-risk area that had 1,000 to 9,999 cumulative confirmed cases during the COVID-19 outbreak (WHO, 2020). This study aims to shed light for school counselors and staffs on more successful identification of high-risk individuals when planning targeted early interventions.

2. Method

2.1. Participants

After the COVID-19 pandemic being effectively brought under control in China, the Ministry of Education in Guangzhou province has permitted students to return to school in batches starting May 11, 2020. A convenience sample of 9,561 college students who voluntarily applied to returning to campus in the first batch was recruited from 20 colleges and universities (Sampling time: from June 1 to June 15, 2020) in Guangdong province, China. Six hundred and forty students with incomplete demographic information of more than 25% were subsequently excluded, resulting in a total sample of 8,921 in the current study.

2.2. Procedure

Data was collected using the “Survey Star” system through a specific web link or quick response (QR) code. Before accessing the survey, participants needed to read through an electronic invitation letter with the option of informed consent at the end. After clicking the option “I agree to participate in the survey”, consented participants could access the questionnaire. As the system allowed voluntary withdrawal at all length of the questionnaire, participants could exit the page whenever they wished to do so. They were also advised to pause and seek help if they experienced discomfort at any time during or following their participation in the study, with contact details of university mental health services appropriately signposted. The ethics board of the South China Normal University (Ethics_No_SCNU-PSY-2020-01-001) examined and approved the project.

2.3. Measures

2.3.1. Socio-demographic characteristics

Socio-demographic data included gender, age, education level, ethnicity, single child status, residency status and so on.

2.3.2. Impact from the COVID-19

This self-made questionnaire was used to measure social impact of the COVID-19 among college students. The participants were invited to answer the following three questions: “Has the COVID-19 affected your family's income?”, “Has the COVID-19 affected your academic activities?”, and “Has the COVID-19 affected your social communication?”. The responses included: “never” (score 1), “mild impact” (score 2), “moderate impact” (score 3), and “severe impact” (score 4).

2.3.3. Depression and anxiety

The 9-item Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001) and 7-item Generalized Anxiety Disorder Scale (GAD-7) (Spitzer et al., 2006) were used to measure students' depressive and anxiety symptoms in the past two weeks, respectively. PHQ-9 and GAD-7 are brief self-report scales, which are reported to be reliable and valid measures of screening and diagnosis of depression and anxiety in previous COVID-19 surveys (Ma et al., 2020; Cao et al., 2020; Lai et al., 2020). Responses to items were recorded from 0 (not at all) to 3 (nearly every day), with higher total score indicating a greater tendency of depressive and anxiety symptoms. Probable clinical level of depression and anxiety both screened with the commonly accepted cut-off score of 10 (Manea et al., 2012; Lowe et al., 2008). Its Cronbach's α for PHQ-9 was 0.91, as well as for GAD-7 was 0.94 in this study.

2.3.4. Acute stress

The 6-item Impact of Event Scale (IES-6) was used to assess post-traumatic stress reactions over the past 7 days. Five response options are available on a scale of 0 (not at all) to 4 (extremely). Higher total score indicates higher levels of post-traumatic stress symptoms (Thoresen et al., 2010). A cut-off score of 9 or higher was found with the best overall efficiency for detecting a probable clinical acute stress disorder (Jalloh et al., 2018). In the current sample, Cronbach's α for IES-6 was 0.80.

2.3.5. Insomnia

The 8-item Youth Self Rating Insomnia Scale (YSIS) was used to quantify sleep quality over the past two weeks. Each item is rated on a 5-point scale, and higher total scores indicating lower level of sleep quality. The score of 26 was proposed as cut-off of the YSIS total scores for clinical insomnia for adolescents (Liu et al., 2019). In the current sample, Cronbach's α for YSIS was 0.90.

2.4. Data analysis

Data analyses were computed with IBM SPSS Version 23.0. An analysis of descriptive statistics was conducted to illustrate the demographic and other selected characteristics of college students. Based on cut-off values of measures (PHQ-9 \geq 10, GAD-7 \geq 10, IES-6 \geq 9, and YSIS \geq 26), participants were screened for potential mental health problems. Pearson correlation analysis was used to examine the relationship between the impact of the COVID-19 and the total score of PHQ-9, GAD-7, IES-6, and YSIS. A univariate analysis (χ^2 test) was conducted to explore the significant associations between sample characteristics and mental health problems. In this study, poor mental health is established if one out of the four indicators (depression, anxiety, acute stress, insomnia) is positive. Statistically significant variables were screened and included in binary logistic regression analyses. The estimates of the strengths of associations were demonstrated by the odds ratio (OR) with a 95% confidence interval (CI). A two-tailed $p < .05$ was considered statistically significant.

3. Results

3.1. Description of the sample

The demographic characteristics are shown in Table 1. The current college sample aged between 16.0 and 25.0 years, with a mean age of 21.59 (SD=1.81) years. Among 8,921 college students, approximately two-third were female (65.7%, n=5,857), and four-fifth were undergraduate (83.3%, n=7,428). Meanwhile, 95.1% (n=8,483) of our participants originated from Guangzhou Province, 34.3% (n=3,063) lived in rural areas, 95.3% (n=8,530) were of Han ethnicity (the ethnic majority in China), 73.3% (n=6,541) were of the only child in their family, and 1.2% (n=103) college students had history of psychiatric conditions.

Table 1
Univariate analysis of college students' mental health [n (%)]

Variables	Total	Depression ^a	Anxiety ^b	Acute stress ^c	Insomnia ^d
Gender					
Male	3,064 (34.3)	254(8.3)	122(4.0)	416(13.6)	205(6.7)
Female	5,857 (65.7)	526(9.0)	255(4.4)	525(9.0)	339(5.8)
χ^2		1.20	0.69	45.38***	2.86
Grade					
Freshman	383 (4.3)	37(9.7)	12(3.1)	50(13.1)	26(6.8)
Sophomore	1958 (21.9)	156(8.0)	58(3.0)	194(9.9)	91(4.6)
Junior	2961 (33.2)	329(11.1)	157(5.3)	370(12.5)	231(7.8)
Senior	2126 (23.8)	149(7.0)	78(3.7)	208(9.8)	103(4.8)
Graduate	1493 (16.7)	109(7.3)	72(4.8)	119(8.0)	93(6.2)
χ^2		34.60***	20.27***	27.14***	28.39***
Residence location					
Urban	3,315 (37.2)	307(9.3)	155(4.7)	314(9.5)	214(6.5)
Rural	5,606 (62.8)	473(8.4)	222(4.0)	627(11.2)	330(5.9)
χ^2		1.77	2.64	6.48*	1.18
Ethnicity					
Han ethnicity	8,530 (95.6)	749(8.8)	364(4.3)	893(10.5)	518(6.1)
Others	391 (4.4)	31(7.9)	13(3.3)	48(12.3)	26(6.6)
χ^2		0.34	0.82	1.29	0.22
Single child status					
No	2,380 (26.7)	576(8.8)	279(4.3)	724(11.1)	394(6.0)
Yes	6,541 (73.3)	204(8.6)	98(4.1)	217(9.1)	150(6.3)
χ^2		0.12	0.09	7.04***	0.24
Had history of psychiatric conditions					
Yes	103 (1.2)	45(43.7)	23 (22.3)	8(7.8)	25(24.3)
No	8,818 (98.8)	735(8.3)	354(4.0)	933(10.6)	519(5.9)
χ^2		159.49***	84.38***	0.85	60.11***

Note: *p<0.05, **p<0.01, ***p<0.001.

^aDepression calculated using the PHQ-9, with a clinical cutoff score of 10.

^bAnxiety calculated using the GAD-7, with a clinical cutoff score of 10.

^cAcute stress calculated using the IES-6, with a clinical cutoff score of 9.

^dInsomnia calculated using the YSIS, with a clinical cutoff score of 26.

3.2. Mental health status in overall sample

In the current sample, 19.8% (n=1766) of college students reported at least one psychological problem. Specifically, 8.7% (n=780) of college students were tested for depression, 4.2% (n=377) had anxiety, 10.5% (n=941) were screened significant acute stress and 6.1% (n=544) exhibited clinical level of insomnia. A small fraction of college students (0.7%~3.4%) displayed patterns of comorbid symptoms, with every pair of cooccurring problems being displayed at least some students who experienced two or more symptoms (see Fig. 1).

3.3. Severity of impact of the COVID-19

As shown in Fig. 2, 83% of college students reported their family's income being affected by COVID-19. 88.4% reported having their academic activities affected. 71.6% reported a reduced social communication. In general, the impacts of the COVID-19 were mostly mild to moderate (67.5%-81.3%), with only a small number of students expressed that one of these parameters has been severely affected (4.1%-6.7%).

3.4. Univariate analysis

Table 1 depicts the relationship between social-demographic variables and mental health problems among college students. Participants that are male gender, living in rural areas, or living with siblings experienced a higher proportion of acute stress upon return to school. Those with history of psychiatric conditions were also more likely to suffer from depression, anxiety, and insomnia. However, no significant effect of ethnicity was found to increase the risk for mental health problems.

3.5. The association of impact of the COVID-19 and mental health

As shown in Table 2, Severity of impact of the COVID-19 is positively association with PHQ-9, GAD-7, IES-6, and YSIS scores.

3.6. Regression analysis

Poor mental health is established if one out of the four indicators (depression, anxiety, acute stress, insomnia) is positive. Results of binary logistic regression analysis of factors associated with poor mental health are presented in Table 3. Significance factors from the univariate analysis and three impact indicators of the COVID-19 (family's income, academic activities, and social communication) are included in the ordered logistic regression analysis.

Risk factors for poor mental health include being Sophomore (OR =1.56, 95% CI = 1.17 -2.08), Senior (OR =1.47, 95% CI = 1.25 -1.74), and having history of psychiatric conditions (OR = 5.26, 95% CI =3.47-7.96). Meanwhile, higher level of impacts from COVID-19 is associated with elevated mental health problems, and impacted academic activities and social communication is the stronger risk factor for poor mental health.

4. Discussion

Based on our best knowledge, this was the first study to examine mental health status among the first batch of college students returning to campus during the COVID-19 in China. Our findings suggested that returning to school, which happened during the post-peak phase of the pandemic in China, did not confer any increase in the prevalence of depression, anxiety, acute stress, and insomnia compared to a similar study conducted on college students during the outbreak phase of COVID-19 (Li et al., 2020a; Li et al., 2020b).

The current study found that 19.8% of the participants reported having depression, anxiety, acute stress, or insomnia after their return

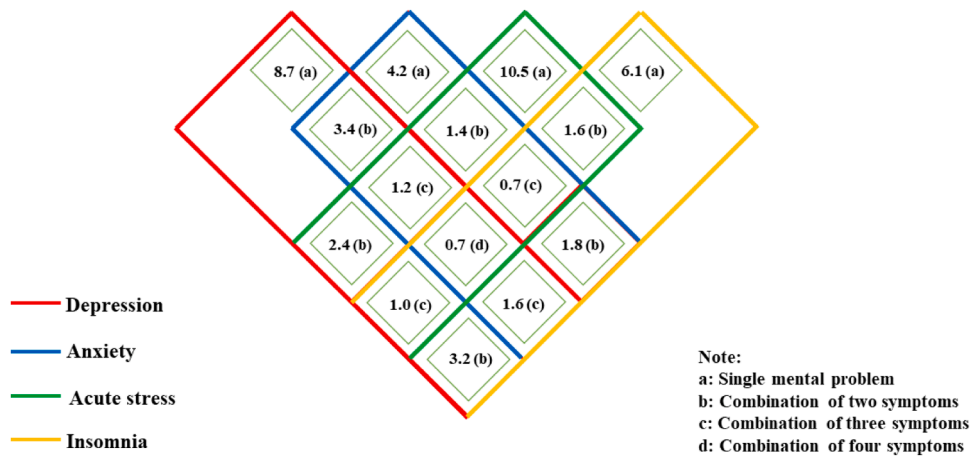


Fig. 1. Mental health status among college students, n (%).

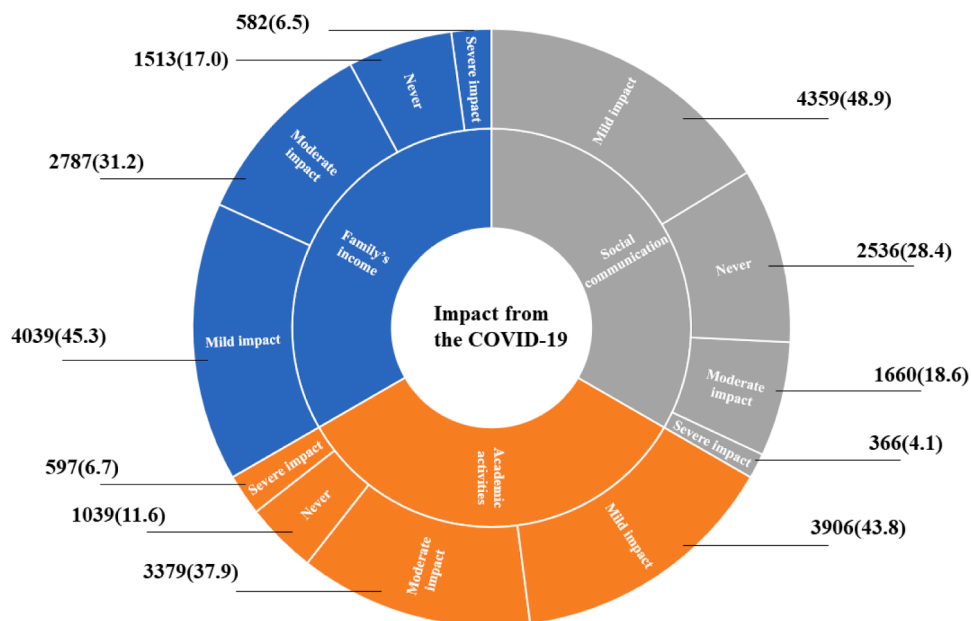


Fig. 2. . Severity of impact of the COVID-19, n (%).

Table 2
The relationship between the impact of the COVID-19 and the mental health.

	M±(SD)	Impact of the COVID-19 Family's income	Academic activities	Social communication
PHQ-9	4.78±4.19	0.18	0.24	0.23
GAD-7	2.93±3.60	0.17	0.23	0.21
IES-6	4.46±3.27	0.19	0.20	0.23
YSIS	15.63±5.81	0.17	0.21	0.21

Note:all p<0.001

school. In order to understand the meaning of our results, they are compared with data of the same type on a national and international scale. It is worth noting that our measurements, which followed the first batch of college students' return to school, took place in June 2020, during which the pandemic was already in its post-peak phase in China. Depression rate (8.7%) in this sample of returning students was lower than that of a similar study measuring Chinese college students'

depression rates (13.2%) during the earlier phase of COVID-19 (February 2020) in the Guangdong province, China (Liang et al., 2020). Compared to data from other countries, depression rates in our sample were also significantly lower than that of U.S. and Asian college students, respectively 50.3% and 23.62% (Rudenstine et al., 2020; Zhao et al., 2020) between March to May 2020. Similarly, anxiety rate (4.2%) was also lower than the results of U.S (41.3%) and Jordan (45.9%) college students (Naser et al., 2020; Rudenstine et al., 2020) during between March to April 2020. Compared with a study that measured the IES-6 mean score of the Chinese college students in the earlier phases of COVID-19, which was 7.30 at beginning of the outbreak (February, 2020) and decreased to 5.05 during remission (March, 2020; Li et al., 2020b), students in this study, showed a much lower mean score of IES-6 (4.78), showing a further decrease in acute stress level as the pandemic being contained. Guided by the conventional IES-6 cut-off score of 9, approximately 34% of Chinese college students reported clinical level of acute stress during COVID-19 outbreak (Li et al., 2020b; Ma et al., 2020), as well as 16.4% students was screened during COVID-19 remission (Li et al., 2020b). Our finding also showed a much lower prevalence of acute stress (10.5%). Besides, this study found that 6.1% of college students exhibited clinical level of insomnia. Although there

Table 3
Results of the logistic regression predicting poor mental health.

Variables	B	S.E.	Wald	P	OR	95%CI
Gender						
Male	(Ref.)					
Female	0.03	0.06	0.29	0.590	1.03	0.92,1.16
Grade						
Freshman	(Ref.)					
Sophomore	0.45	0.15	9.23	0.002	1.56	1.17,2.08
Junior	0.14	0.09	2.30	0.129	1.15	0.96,1.39
Senior	0.39	0.08	20.99	<0.001	1.47	1.25,1.74
Graduate	-0.03	0.09	0.11	0.745	0.97	0.81,1.16
Residence location						
Urban	(Ref.)					
Rural	0.11	0.06	3.16	0.075	1.12	0.99,1.26
Single child status						
No	1.0					
Yes	-0.06	0.07	0.81	0.367	0.939	0.82,1.08
Had history of psychiatric conditions						
No	(Ref.)					
Yes	1.66	0.21	61.37	<0.001	5.26	3.47,7.96
Impact of the COVID-19						
Family's income	0.26	0.04	45.19	<0.001	1.30	1.20,1.40
Academic activities	0.37	0.04	78.73	<0.001	1.45	1.34,1.58
Social communication	0.37	0.04	96.64	<0.001	1.45	1.34,1.56

have been no previous studies using YSIS to survey college students during the pandemic, the result is also significantly lower than the proportion (25.7%) of college students screened through a cut-off score of 5 for the Pittsburgh Sleep Quality Index (PSQI) during pandemic (Zhou et al., 2020b). Altogether, our findings suggested that returning to school did not cause higher level of psychiatric symptoms in college students, which aligned with results of a similar study conducted among students (ages 12–18) in Alberta, Canada, which also reported a below critical level of posttraumatic stress reactions six months into the COVID-19 pandemic (Schwartz et al., 2020). We can therefore argue that the relatively low occurrence of psychiatric disorder in our sample could be due to confidence in prevention measures before the resumption of study. A study conducted by Wang et al. has also shown that mask wearing, a practice that the Chinese government has strongly encouraged since the early stage of the COVID-19 pandemic, safeguards better physical as well as mental health (Wang et al., 2020b). As our survey took place after students' return to school, students have just been lifted from home isolation and resumed their study and social life, which might be beneficial to their mental health. A large number of studies support that long-term confinement is detrimental to the mental health of students. Previous longitudinal studies in China (Li et al., 2020b) and Spain (Planchuelo-Gomez et al., 2020) have shown that depressive and anxiety symptoms have significantly increased throughout the home confinement caused by COVID-19.

However, most students reported disruption of their daily routines due to the COVID-19 pandemic, with adverse influences on academic activities being most frequently reported. In China, in response to the prevention and control measures of the pandemic, the reopening of colleges and universities was postponed. As a result, students have been spending more time at home with courses delivered online. In transition to this unconventional form of teaching, some students might have overwhelming concerns about their academic attainments (Son et al., 2020), which might be aggravated by the general reduction of time spent on studying due to the pandemic (Meo et al., 2020). Meanwhile, many students shared the financial burdens from their families, whose incomes have been affected to various extents by lockdown measures on the economy and on individuals (Kernan, 2019). Multiple travel restriction measures and extended holidays issued by the government also altered families' financial structure to a certain extent (Tang et al.,

2020). Besides, social interactions were also constrained due to physical distancing (Son et al., 2020), which increased the feeling of loneliness and led to potential mental health problems.

Our study also identified several factors that increase the likelihood of college students to experience mental health issues. In terms of grades, being sophomore and senior are both risk factors. This may be explained by the current curriculum design in Chinese universities. The sophomore year is loaded with considerably more professional courses compared to the freshman year. After sophomores' return to school, they were often facing frequent evaluations, which may further contribute to stress and anxiety. On the other hand, the pandemic has severely affected the graduation and employment for senior students (Cao et al., 2020; Cornine, 2020), which may greatly contribute to their psychiatric symptoms. In our study, participants with previous history of psychiatric conditions were reported to be more susceptible to mental health problems. This finding further confirms the conclusion by Yao et al., who suggested that those with mental health disorders might experience worsening symptoms during COVID-19 (Yao et al., 2020). Besides, severe interference due to COVID-19 on family's income, academic activities, and social communication is also associated with more significant mental health problem among college students. It was inevitable that some families would lose their source of income. Students in these households might have to worry about paying their tuition fees and other expenses, which result in increased anxiety (Peng et al., 2012). Impacts of COVID-19 on academic and social interactions were also observed to be linked to psychiatric symptoms, which aligns with findings in previous studies (Chen et al., 2020; Li et al., 2020a; Li et al., 2020b). In addition, consistent with previous studies, we also found that multiple psychosocial factors such as being male (Ma et al., 2020), non-single child (Li et al., 2020b) and living in rural areas (Li et al., 2020b) all contribute to higher prevalence of acute stress after Chi-square test analyses ($P < 0.05$). These factors should also be taken into consideration when planning personalized psychosocial interventions after students' return school during the COVID-19 pandemic. Evidence-based studies have shown the effectiveness of cognitive behaviour therapy (CBT), especially internet CBT (I-CBT) in reducing the psychological impact of the pandemic (Ho et al., 2020a). I-CBT also owns the great benefit of cost effectiveness (Zhang et al., 2017), as it has been widely used in the treatment of psychiatric conditions such as insomnia (Soh et al., 2020) as well as eating disorders (Low et al., 2021).

Last but not least, the authors are aware of several limitations of this study. First, the cross-sectional design of the study limits the ability to make causal inference. Although other longitudinal studies have examined changes in psychological symptoms during the early stages of the pandemic outbreak among college students (Li et al., 2020b) and general public (Wang et al., 2020c), our participants' mental health status were only collected once after their return to school. Second, this study was conducted during the early period of COVID-19 control, when the impact of COVID-19 is yet to be identified. Finally, due to the self-reporting form of the questionnaire, there might be potential reporting bias in the data collection. This study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make clinical diagnosis. The gold standard for establishing psychiatric diagnosis involved structured clinical interview and functional neuroimaging is necessary (Ho et al., 2020b; Husain et al., 2020a; Husain et al., 2020b). Therefore, future research should follow up with formal clinical assessments to draw thorough conclusion, especially for students suspected being high risk for developing mental health problems.

5. Conclusion

In conclusion, this study first described the general mental health status of the first batch of Chinese college students that returned to school in June 2020. Among the participants, 19.8% reported at least

one psychological problem (e.g., depression, anxiety, acute stress, insomnia), while 0.7%–3.4% suffered from two or more symptoms at the same time. Compared with studies that investigated college students' mental well-being conducted in the earlier phases of the pandemic (outbreak and remission), results of the current study suggested that return to school during the post-peak stage of the pandemic is not associated with higher risk of mental health issues. We did, however, identify several risk factors for the occurrence of psychiatric events among returning college students. Altogether, these findings allow school administrators to be aware of the extent of mental health issues among college students and to design specific programs that respond to vulnerable groups' needs after their return to school.

Contributors

Dongfang Wang: Conceptualization, Data curation, Formal analysis, Writing-original draft. Huilin Chen, and Shuyi Zhai: Writing - review & editing. Zhiyi Zhu, Shuiqing Huang Xiuzhu Zhou, Ye Pan, Dongjing Meng, and Zheng Yang: Investigation. Jingbo Zhao: Resources, Supervision. Fang Fan: Supervision, Project administration. Xianchen Liu: Supervision, Writing - review & editing.

Role of the founding source

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Declaration of Competing Interest

The authors declare no conflicts of interest regarding data and materials presented in this paper.

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