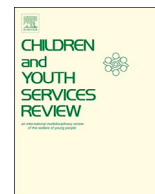




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Knowledge, attitudes and mental health of university students during the COVID-19 pandemic in China



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ABSTRACT

Background: Little is known about the psychological impact of COVID-19 on university students during the disease outbreak in China, but this information is important for the development of services to support these students who are typically in their early 20s. Thus, the aim of this study was to examine university students' knowledge, attitudes, and mental health status during the COVID-19 pandemic in China.

Methods: On February 10, 2020 and during the second week of national lockdown, 511 students from a university in China were assessed using the COVID-19 General Information Questionnaire and the Symptom Checklist 90 (SCL-90) questionnaire. To understand the mental health status of the current sample, we compared it with the normal population.

Results: Four hundred and seventy-two valid questionnaires were collected. In total, 11% of respondents reported confirmed COVID-19 cases in their hometowns or communities. In view of students' knowledge about COVID-19, 56% had sufficient knowledge of typical symptoms of COVID-19, and 41% knew a lot about prevention methods for the future pandemic. In terms of the risk perceptions, 57% had experienced considerable fear of this disease, and 19% perceived a high risk of becoming infected. In terms of attitudes towards the COVID-19 pandemic, 63% felt positive about its development (i.e., it was generally under control), and 92% declared that they were willing to be vaccinated against COVID-19. The scores for somatization, obsessive-compulsive disorder, interpersonal sensitivity, anxiety, phobic anxiety, paranoid ideation, and the general severity index were significantly increased compared with the norm ($p < 0.001$). However, no differences in the scores for depression, hostility and psychoticism were noted ($p > 0.05$).

Conclusion: University students possessed insufficient COVID-19 knowledge and high-risk perceptions. The COVID-19 pandemic impacted the mental health of university students. Social support and targeted interventions tailored to university students should be provided during such an outbreak, and university administration should strengthen the cultivation of students' mental toughness using standard teaching processes.

1. Introduction

In December 2019, Corona Virus Disease 2019 (COVID-19) was identified in Wuhan, Hubei province, China. The disease is associated with a novel corona-virus, which is the seventh corona-virus known to infect humans (Fan, Zeng, & Xu, 2020). At the end of June 2020, approximately 500,000 deaths worldwide have been linked to COVID-19 (Xinhua, 2020), posing a global threat. Since no specific interventions against the agent were available during the outbreak, strict national policies regarding public behavior were implemented at domestic level in many countries, including France, America and China (Yulia & Tanya, 2020). Chinese local governments issued recommendations to keep COVID-19 from spreading to a wider population. Such

recommendations included making public service announcements about personal protection, requesting that people returning from pandemic areas stay home for at least 14 days (since the incubation period of COVID-19 is 1-33 days), and asking those who had been in close contact with patients report to designated medical centers for screening (Zhu et al., 2020).

The appearance of psychological symptoms often arise in the aftermath of disasters (Ko, Yen, Yen, & Yang, 2006) and may be related to the lack of psychological resources (Finkelstein, Kubzansky, Capitman, & Goodman, 2007). Prior studies have examined the mental health effects of infectious disease outbreaks, including the 2003 severe acute respiratory syndrome (SARS) (Ko et al., 2006), the 2009 novel influenza A (H1N1) (Yeung, Lau, Choi, & Griffiths, 2017), and the 2018

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Ebola pandemic (Jalloh et al., 2018). Almost all of these studies revealed negative mental health effects from disease outbreaks. During the outbreak of COVID-19, the illness uncertainty was associated with physical suffering and impacts psychological well-being (Bao, Sun, Meng, Shi, & Lu, 2020; Mazza, Marano, Lai, Janiri, & Sani, 2020). If psychological interventions can be mitigated in a timely and appropriate manner, it can bolster an individual's mental health status (Jalloh et al., 2018). To our best knowledge, many studies have examined the mental health effects of infectious disease outbreaks on university students, including the SARS (Wong et al., 2005) and H1N1 epidemic (Yeung et al., 2017); however, only a few studies have investigated the psycho-behavioral impact of COVID-19 on specific populations, such as university students (Zhu et al., 2020). Our research group also performed an investigation in the early stage of the COVID-19 outbreak and found that some university students experienced emotional fluctuations and even depression due to long-term home quarantine. Additional research is needed to better understand the effects of COVID-19 on university students' mental health outcomes during large-scale outbreaks. Aiming to capture university students' risk perceptions, attitudes, and mental health status, this study conducted a cross-sectional survey during the COVID-19 Pandemic in China and compared it with the norm (Liu et al., 2018). The hypothesis that differences exist between the mental health status of university students and the norm was tested.

2. Materials & methods

2.1. Sampling

In this study, a university in China was selected as the sampling site, and two classes for each grade in each major were selected using a random cluster sampling method. A total of 16 classes and 511 university students were invited to participate in an online assessment. Four hundred and eighty-five questionnaires were returned. After two rounds of screening, 472 valid questionnaires were confirmed, and 13 student responses were deemed not valid. Among the valid subjects, 227 were boys, and 245 were girls. Their age range was 17–22 years.

2.2. Instrument

A scripted set of instructions was used to introduce the questionnaires. The survey questions were designed based on a literature review and informal interviews with 25 Chinese university students. These questions included a statement that there were no right or wrong answers and that the purpose was to identify the participants' feelings or experiences related to the topic of investigation. We assured participants that the study was voluntary, anonymous, and confidential.

Participants' age, gender, and grade were collected using single-item measures. We adopted the COVID-19 General Information Questionnaire to collect participants' knowledge and perceptions about the pandemic.

The 90-item Symptom Checklist (SCL-90, Derogatis, 1977) was used to evaluate the mental health status of university students. This scale is a widely used psychiatric questionnaire designed to measure self-reported symptom intensity on nine subscales: somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Chinese scholars introduced this scale to China and found that it had good reliability and validity, and the Cronbach's alpha coefficient for the 90 items was 0.98 ($P < 0.001$) with a range of 0.75–0.90 for the nine subscales (Tan, Lan, Yu, & Yang, 2015). Participants were asked to report their symptoms in the past week on a Likert scale from 1 (not at all) to 5 (extremely). The scores range from 90 to 450. A higher score indicates higher perceived risk. In the present sample, the symptom subscales were moderately to highly correlated with each other ($r_s = 0.53$ – 0.87). The SCL-90 also showed acceptable internal

reliability and factorial validity for measuring mental outcomes following the SARS outbreak in China (Main, Zhou, Ma, Luecken, & Liu, 2011).

2.3. Data collection

This is a cross-sectional study that was conducted on February 10, 2020. The study was reviewed and approved by the scientific research management department, and all participants provided electronic copies of informed consent. The Star software platform (Ranxing, inc., Changsha, China) was used for this online survey. The questionnaire was anonymous (demographic questions were asked but did not include identification details). The respondents could submit their surveys through the Star software platform after completing the questionnaire. After all subjects completed the questionnaires, the platform screened them according to the established rules (i.e., the record will be deleted if the answer time is less than 120 s). Then, the testers reviewed them individually to eliminate invalid questionnaires (i.e., with incomplete answers or answer in repetition).

2.4. Statistical analysis

We primarily used inferential descriptive statistics including one-sample *t*-test to compare the mental health in our study sample against the norm. Analyses were performed in IBM SPSS for Windows Version 20. Statistical significance was defined as a two-tailed *p*-value less than 0.05.

3. Results

3.1. Knowledge and attitudes towards COVID-19 pandemic

Table 1 shows the knowledge and attitudes towards COVID-19 pandemic under investigation. In total, 11% of respondents reported confirmed COVID-19 cases in their hometowns or communities. In view of students' knowledge about COVID-19, 56% had adequate knowledge of COVID-19 typical symptoms, and 41% knew a lot about the

Table 1

Knowledge and cognitive characteristics of college students regarding the pandemic ($n = 472$).

Characteristics	n	%
Are there COVID-19 infections in the township or community?		
Yes	51	11%
No	421	89%
Knowledge about the typical symptoms of COVID-19 pandemic		
A lot	262	56%
Some	139	29%
Little	71	15%
Knowledge about future pandemic prevention		
A lot	195	41%
Some	231	49%
Little	46	10%
Experiencing fear of the pandemic		
A great deal	269	57%
Not much/a little	203	43%
Possibility of yourself getting infected		
High	89	19%
Moderate	167	35%
Low	178	38%
Zero	38	8%
Expectations for the pandemic		
Hard to control	129	28%
Could be controlled (eventually)	133	28%
Will soon be under control	166	35%
Uncertain	44	9%
Attitudes toward COVID-19 vaccination		
Willing to be vaccinated	433	92%
Against vaccination	39	8%

Table 2
Comparative analysis of students' mental health in different periods ($\bar{x} \pm s$).

Sub-scale/General index	Norm (n = 12160)		Participants in this study (n = 472)		t	Effect Size	p
	Mean value	SD	Mean value	SD			
Somatization	1.37	0.46	1.58	0.28	-15.78	-0.55	< 0.001
Obsessive-compulsive disorder	1.66	0.58	1.73	0.32	-4.95	-0.15	< 0.001
Interpersonal sensitivity	1.51	0.55	1.67	0.48	-7.07	-0.31	< 0.001
Depression	1.45	0.53	1.48	0.37	-1.42	-0.07	0.056
Anxiety	1.40	0.48	1.55	0.33	-9.73	-0.36	< 0.001
Hostility	1.48	0.57	1.50	0.31	-1.45	0.04	0.148
Phobic anxiety	1.23	0.39	1.54	0.36	-18.74	-0.83	< 0.001
Paranoid ideation	1.41	0.50	1.54	0.41	-6.82	-0.28	< 0.001
Psychoticism	1.34	0.44	1.39	0.30	-3.81	-0.13	0.090
General severity Index	1.51	0.58	1.55	0.10	-9.24	-0.10	< 0.001

prevention methods of future pandemic. In terms of the risk perceptions, 57% had experienced considerable fear of the COVID-19 pandemic, and 19% perceived a high-risk level of becoming infected. Regarding attitudes towards COVID-19 pandemic, 63% felt positive about the development of the pandemic (i.e., it was generally under control). In total, 92% declared that they were willing to be vaccinated against COVID-19, whereas only 8% stated they would not.

3.2. SCL-90 scores during COVID-19 pandemic

The mental health scores of university students exhibited a normal distribution. This study compared the participants' scores in this test (n = 472) with the population norm (n = 12,160) (Y. Liu et al., 2018). Table 2 displays the results, and there were no differences in the scores for depression, hostility and psychoticism. Differences in the scores for other factors and the general severity index (GSI) were noted. Participants in this study reported higher than normal levels in somatization (1.58 vs 1.37, $p < 0.001$), obsessive-compulsive disorder (1.73 vs 1.66, $p < 0.001$), interpersonal sensitivity (1.67 vs 1.51, $p < 0.001$), anxiety (1.55 vs 1.40, $p < 0.001$), phobic anxiety (1.54 vs 1.23, $p < 0.001$), paranoid ideation (1.54 vs 1.41, $p < 0.001$), and general severity index (1.55 vs 1.51, $p < 0.001$), indicating that the mental health status of university students was clearly worse than the norm. The effect sizes related to the differences were generally large, and these results supported the research hypothesis.

4. Discussion

This study aimed to address university students' mental health during the COVID-19 pandemic. The results showed that university students were significantly affected by the COVID-19. Approximately half of participants reported adequate or comprehensive knowledge of COVID-19, relying mostly on news media for information about the disease. A previous study of US university students revealed deficiencies in knowledge about Ebola during the outbreak (Koralek, Brown, & Runnerstrom, 2015). This notion could explain why a high proportion of university students (57%) experienced fear and the great majority of university students (92%) were willing to be vaccinated in this study. Since we performed this survey at the beginning of the COVID-19 pandemic, a considerably amount of information about the virus is unknown, and the public was filled with uncertainty and fear about this new and unusual virus. Thus, there was a need to plan for the timely and efficient dissemination of accurate disease information to high-risk groups. During the SARS outbreak, the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) in China along with many other countries used media and the internet to spread SARS-related messages to the public to help mitigate negative public reactions (Wong et al., 2005). In addition, most students in the present study (63%) believed the disease would be controlled in China, indicating positive attitudes about current control

measures.

It is well established that stressful events can significantly affect one's psychological well-being (Liu, 2017). The one-sample *t*-test revealed highly significant differences between the mean scores of these respondents and the norm ($p < 0.001$) in most dimensions and for the general severity index (GSI) (Table 2). These results suggested that the COVID-19 situation affects the mental health in the general population and not just the mental health of those who are most directly affected. This interpretation is also supported by other COVID-19 studies (Bao et al., 2020), suggesting that the COVID-19 outbreak may have adverse psychological impacts beyond the individual (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020). In a study conducted during the first phase of the COVID-19 outbreak in China, greater than half of the respondents rated the psychological impact as moderate-to-severe, and approximately one-third reported moderate-to-severe anxiety (C. Mazza et al., 2020). Similar to COVID-19, the 2009 H1N1 pandemic was also associated with psychological distress in the general population (Liao, Cowling, Lam, Ng, & Fielding, 2014), which initially occurred in response to the pandemic itself and later in response to stressful events related to work and everyday life. Negative effects can lead to somatic symptoms as documented in various studies (Bailey & Henry, 2007). The participants of this study experienced obsession, anxiety and fear related to the pandemic. Moreover, we suggest that the predominance of obsession resulted from having to wash hands to prevent infection. In general, we believe that the worsened psychological status could be explained by the specific circumstances during the COVID-19 pandemic. These circumstances include home quarantine, fear of becoming infected with COVID-19, uncertainty about the pandemic development, challenges of remote learning, and more. However, depression and psychoticism were not obvious in this study potentially because the formation of these two symptoms is a gradual process of accumulation and short-term external emergencies are not enough to cause strong individual psychological disorders. Thus, other studies on SARS have reported the prevalence of depression (Ko et al., 2006) or psychiatric morbidity (Peng et al., 2010) after the pandemic ended.

This study's findings highlight the feasibility and importance of monitoring and dealing with the mental health of university students during pandemic outbreaks (Jalloh et al., 2018). Psycho-social support and targeted interventions tailored to students are essential and important during the COVID-19 pandemic (Wang et al., 2020). Moreover, our results can help policy makers and university administrators understand how and to what extent university students were affected and to develop more effective interventions for these students during and after disease outbreaks to prevent the occurrence of psychological crisis (Richard, Richard, & Anke, 2003).

This study has some limitations. First, data were collected using a cross-sectional online survey; therefore, assumptions about causal relationships should not be made. Second, no follow-up survey was conducted to further understand the psychological development of this group. In the future, the method of tracking test can be used for deep

research.

5. Conclusions

Our results showed that Chinese university students possessed insufficient COVID-19 knowledge and high-risk perceptions. The pandemic outbreak had a negative impact on the mental health of university students, suggesting that we should strengthen the cultivation of students' mental toughness in typical teaching processes. In addition, related medical departments should strengthen the monitoring capability of public health events on campus.

Ethical Statements

The study was reviewed and approved by the scientific research management department of Anqing Normal University and all participants gave informed consent.

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None.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chilgyouth.2020.105494>.

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