

## RESEARCH ARTICLE

# Factors associated with anxiety and quality of life of the Wuhan populace during the COVID-19 pandemic

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## Abstract

In December 2019, COVID-19 broke out in Wuhan, China, affecting the mental health and quality of life (QoL) of its inhabitants. This study aimed at investigating the factors associated with anxiety and QoL in the Wuhan populace during the COVID-19 pandemic. An online questionnaire survey was carried out during July 6–10, 2020. The questionnaire collected information on demography, anxiety, QoL, and social-environmental support. The main statistical methods included descriptive statistics, independent-samples *t*-test, one-way analysis of variance, and multivariate regression analysis. In total, 226 participants were recruited. The findings showed that females, elderly, middle-income, poor health status, shortage of medical supplies, and insufficient basic commodities were associated with anxiety significantly. Multiple regression analysis indicated that social-environmental support was significantly related to anxiety. Higher social-environmental support was significantly associated with a higher QoL. Our findings showed that the social-environmental support may reduce anxiety and improve the QoL for those living in an area heavily affected by the pandemic.

## KEYWORDS

anxiety, COVID-19, quality of life, social-environmental support

## 1 | INTRODUCTION

In December 2019, Wuhan, the capital of Hubei Province of China, was hit by the coronavirus 2019 (COVID-19; Bao et al., 2020). It was another infectious disease outbreak that has since posed a major threat to public health worldwide after severe acute respiratory syndrome (SARS), H1N1, and avian influenza. The sudden surge of this novel coronavirus occurred at the time of the Chinese New Year during which the heavy human traffic contributed to the rapid spread of the virus. A 76-day lockdown and quarantine measures were implemented in Wuhan from January 23 to 8 April 2020 in an attempt to check the large scale global spread of this pandemic (Lancet, 2020b). The quarantine of a city with a population of more than 10 million was unprecedented in the public health history. The outbreak of the pandemic undoubtedly impacted all walks of life in a

society, especially the mental health and the quality of life (QoL) of the Wuhan's populace.

Sudden public health incidents can affect one's mental health, and adults are more likely to suffer from adverse mental health symptoms such as anxiety (Guan et al., 2020; Rao et al., 2020). The residents of Wuhan who went through a long period of quarantine during the COVID-19 may have experienced various levels of anxiety and powerlessness as well as other negative emotions that may even drive them towards suicide and other self-sabotaging behaviours. Besides, the aftermath might persist three years after lifting of the quarantine (Brooks et al., 2020; Sher, 2020). During the pandemic, there was a severe shortage of masks, sanitizers, food, and other materials in Wuhan. A lack of such badly needed primary life-sustaining commodities and medical supplies (Z. Zhang, Yao, et al., 2020) may pose a threat to the population's existence and

mental health (Maslow, 1954). Those who lived outside Wuhan could take a glimpse into the home-isolated Wuhan populace only through the public media, which was flooded with rumours and false information that may arouse panic as well as exacerbate anxiety and fear among the general public (Ayittey et al., 2020; Olatunji et al., 2020; Zarocostas, 2020). Past studies (Hideki et al., 2008) have indicated that social support can reduce the negative impacts of public health emergencies on people's mental health. A previous report has demonstrated that improved social support during the COVID-19 pandemic may alleviate the detrimental beliefs eroding the mental health of the Wuhan population (Yu et al., 2020). Therefore, understanding the factors associated with people's anxiety in Wuhan would help the government tailor appropriate intervention measures targeting the emotional turmoil triggered by the pandemic.

QoL, which reflects the degree of fulfilment of the physical, psychological, social, and emotional needs of an individual in response to environmental requirements (WHOQOL Group, 1998), has not been adequately addressed for those living in a region heavily affected by COVID-19. The QoL of those with chronic diseases and the elderly in such a badly affected area (i.e., Wuhan) is further hampered because of their increased risk of contracting the disease. In addition, the physical and mental impair caused by the pandemic also adversely affects the QoL of those involved (Agarwal et al., 2020; Zomalheto et al., 2020). QoL in the midst of a growing epidemic can be influenced by several factors, including knowledge of the disease, information sources and material needs (H.-C. Wu et al., 2006; Y. Zhong et al., 2021). In this aspect, an all-round social-environmental support program may have a positive impact on their QoL.

However, studies consistently reported that the social-environment support could protect individuals from developing mental health problems when they experience difficult time (Xu & He, 2012). Social support is a multiconstruct with multiple dimensions such as subjective support, objective support, and seeking-social support (Xiao, 1994). It has been found to be a major way of improving the QoL and maintaining a healthy state of mind and body (Lan et al., 2015; Yilmaz, Piyal, & Akdur, 2017). Previous studies have demonstrated that the importance of social support in both emotional (e.g., from parents, friends, caregivers) and material aspects for protecting against anxiety that have been triggered by disasters, calamities, and outbreaks of infectious diseases (Bloom et al., 2017; Veenema et al., 2017). In addition, environmental support is just as significant as social support, which including the accessibility to accurate information about COVID-19 to avoid public consternation caused by the 'infodemic' (Veenema et al., 2017; Wang et al., 2020). Although there may be no effective way to prevent the spread of the COVID-19 pandemic in this era of globalization when physical distance is no longer a barrier, a proper understanding of the disease may help in suppressing rumours and the resulting panic (C.-Y. Lin, 2020). For instance, imprudent hoarding of commodities and medical supplies (e.g., hand sanitizer, medicines, protective masks, and even toilet paper) by those who over-reacted to the pandemic (Dubey et al., 2020) may result in social chaos.

Conceivably, inhabitants of Wuhan who were forced to be placed on prolonged home quarantine may be anxiety that negatively impacted their QoL. Therefore, this study aimed at elucidating the factors associated with the impacts on the anxiety and QoL of the Wuhan populace during the COVID-19 assault in an attempt to improve the mental health and QoL of those being affected by the pandemic.

## 2 | METHODS

### 2.1 | Study design and participants

This cross-sectional questionnaire-based study, which was conducted between July 6 and 10, 2020, mainly targeted Wuhan residents during the COVID-19 pandemic. Inclusion criteria were: (1) Inhabitants of Wuhan during the COVID-19 attack (23 January to 10 July 2020); (2) Individuals over 20 years of age; (3) Those who could understand the contents of the questionnaire. Participants who failed to complete the questionnaire were excluded. This study was approved by the Research Ethics Center of China Medical University and Affiliated Hospital (CRREC-109-077). A total of 226 responses were retrieved after screening.

This study adopted the method of snowball sampling that involved the recruitment of participants through the 'WeChat' application and those enrolled were encouraged to recruit more subjects for the study. The participants were then required to complete a questionnaire through an online survey platform ('SurveyStar,' Changsha Ranxing Science and Technology, Shanghai, China). During the process, the participants were honestly informed that the study would be beneficial to society, and their responses would remain anonymous. The participants signed informed consent before answering the questionnaire and were free to withdraw from the study at any time without any repercussions. At the end of the survey, the data were collected in the form of a structured questionnaire.

To ensure the quality and completeness of the collected data, all information needed to be uploaded through a single mobile phone or computer to avoid duplicated submissions. The responses were checked logically by the system with the invalid ones discarded. All valid responses were automatically entered into a data file and checked by one independent researcher. The information regarding the demographic characteristics of participants, factors reflecting the degree of social-environmental support, anxiety level, and QoL were also collected in the questionnaire.

### 2.2 | Questionnaire

The questionnaire was divided into four main sections. The first section aimed at collecting the necessary demographic information. The participants were required to fill in their gender, age, body mass index (BMI), monthly income, health status, and whether they were

infected with COVID-19 according to the results of official nucleic acid testing conducted in Wuhan on May 14. Their names and other personal information were not collected to ensure anonymity of their responses.

The second section of the questionnaire focused on the degree of social-environmental support that the participant received. The strength of social support was assessed using the Social Support Rating Scale (SSRS), while the degree of environment support was evaluated with four self-developed items. The SSRS, which is a 10-item self-reported scale that assesses the level of an individual's social support (Xiao, 1994), consists of three subscales: subjective support (four items), objective support (three items), and seeking-social support (three items). While subjective support reflects the perceived interpersonal network that an individual can count on, objective support signifies the degree of actual support an individual received in the past. Support-seeking behaviour refers to the pattern of behaviour that an individual utilizes when seeking social support. Each item was scored using a four-point Likert Scale. Item scores of the SSRS were computed by summation, generating a total support score ranging from 12 to 66, a subjective support score ranging from 8 to 32, an objective support score ranging from 1 to 22, and a support-seeking behaviour score ranging from 3 to 12. Higher scores indicate stronger social support. SSRS has been shown to have good reliability and validity (Xiao, 1994).

Regarding the environmental support, previous studies indicated that during times of pandemic many people exhibit fear and anxiety-related distress responses that include the following: fear of supplies are running low, and fear of information uncertainty (Baloran, 2020; Hobbs, 2020; Ma et al., 2020; Ranney et al., 2020; Taylor et al., 2020; Y. Zhong et al., 2021). The environment support questionnaire was developed to measure the aforementioned features as well as to assess COVID-19-related distress, thus targeted giving of support. Four self-developed items were used for assessment: 'Do you have enough medical supplies?'; 'Are your basic commodities adequate to sustain daily life?'; 'Do you have accessibility to information about COVID-19?' and 'Do you possess sufficient knowledge to deal with COVID-19?'. The response for each item was scored with a five-point Likert scale from 1 (not at all) to 5 (completely). Higher scores indicate stronger environmental support. The total score of the social-environment support was the sum of SSRS and environmental support. The Cronbach's  $\alpha$  coefficient of the social-environment support was 0.77 in this study (Social support  $\alpha = 0.75$  and the environment support  $\alpha = 0.72$ ).

The third section of the questionnaire assessed the degree of anxiety of participants by using the Generalized Anxiety Scale (GAD-7; Spitzer et al., 2006) in which a 7-item scale was used to estimate the incidence of anxiety disorder in the past two weeks. A four-point Likert scale (0: not at all; 1: several days; 2: over half the period; 3: nearly every day) was utilized to score the response to each item. The total score ranging between 0 and 21 was acquired by summation of the scores from item 1 to 7. The criteria for the interpretation of the degree of anxiety were: none/normal (0 to 5 points), mild (5 to 9 points), moderate (10 to 14 points) and severe (15 to 21 points).

A previous study has validated the Chinese version of the scale as a clinical screening tool for primary medical care in China (He et al., 2010). The Cronbach's  $\alpha$  coefficient of the GAD-7 was 0.93 in this study.

The fourth section of the questionnaire involved evaluation of QoL of participants using the Chinese version of the brief version of the World Health Organization QoL (WHOQOL-BREF), which is a self-assessment and cross-cultural instrument that has been translated into several languages (WHOQOL Group, 1998). It includes four domains, namely, physical, psychological, social relationships, and environment. Of the 28 items in the WHOQOL-BREF, two focussing on overall health and general QoL are not included in the four domains. There are 26 items in the Chinese version of the WHOQOL-BREF: physical health (seven items), psychological health (six items), social relationships (three items), and environment (eight items) as well as two additional local items: 'Does family friction affect your life?' and 'How is your appetite?' (Fang, 2000). A five-point Likert scale was used with minimum and maximum scores of 1 and 5, respectively, for each question, where a higher score indicated a higher QoL. The Cronbach's  $\alpha$  coefficient of the WHOQOL-BREF was 0.94 in this study (physical health  $\alpha = 0.77$ , psychological health  $\alpha = 0.84$ , social relations  $\alpha = 0.74$ , and the environment  $\alpha = 0.87$ ).

### 2.3 | Statistical analysis

The statistical software, SPSS version 22.0, was used for the whole study. Descriptive statistics were used to present demographic data and social-environmental support (including SSRS total score and another four self-developed items). Independent-samples *t*-test and one-way analysis of variance (ANOVA) were used to evaluate whether there were any significant differences between demographic data as well as that between social-environmental support items and GAD-7 scores. Scheffe post hoc test was used to check the pairwise difference between the groups.

Multiple regression analysis was used to confirm the association between social-environmental support and GAD-7 affected by the COVID-19 pandemic. The total score on GAD-7 and the scores on social-environmental support served as the dependent and independent variables, respectively. Additionally, multiple regression analysis was used to finally confirm the association between social-environmental support factors and QoL affected by the COVID-19 pandemic. The total score on WHOQOL-BREF and the scores on social-environmental support served as the dependent and independent variables, respectively. Because gender (Campos et al., 2014; Furukawa et al., 2001; Özdin & Bayrak Özdin, 2020; J. Zhang, Li, et al., 2020), age (Asar & Hakeem, 2013; Bando et al., 2015; Yueqin Huang et al., 2019), BMI (Kelderman-Bolk et al., 2015; Kukreti, 2015), monthly income (Campos et al., 2014; Maria et al., 2010; Yoshitake et al., 2016), and health status (Campos et al., 2014; Dai et al., 2020) might affect anxiety and QoL, they were controlled during the analysis. In addition, variance

expansion factors were used to diagnose collinearity in multiple regression analyses in this study. However, it was found that the variable inflation factor (VIF) of all independent variables was less than 10, indicating that the issue of collinearity can be ignored (Marquardt, 1980).

### 3 | RESULTS

#### 3.1 | Demographic characteristics and social-environmental support of study participants

The demographic data of the participants are shown in Table 1. A total of 226 Wuhan residents were invited to participate in this study. Most participants were males (69.5%). The mean age was  $32.58 \pm 13.67$  years with an average BMI of  $22.25 \pm 2.96$ . In addition, 30.5% had monthly incomes of 2000 or below. The total score of the GAD-7 was  $4.90 \pm 4.06$ . The total score of the QoL was  $57.44 \pm 9.03$  (Physical health  $15.09 \pm 2.43$ , psychological health  $14.58 \pm 2.72$ , social relationships  $13.94 \pm 2.60$ , environment  $13.82 \pm 2.63$ ). Moreover, 42.9% of participants had moderately adequate medical supplies, while 43.8% had moderately adequate supplies of basic commodities. None of the participant was infected with COVID-19. Analysis with *t*-test and one-way ANOVA revealed significant differences in GAD-7 scores with respect to gender, age, monthly income, health status, medical supplies, and basic commodities ( $p < 0.01$ – $0.05$ ). The results of the Scheffe post hoc analysis are also shown in Table 1.

#### 3.2 | Multiple regression analysis

The multiple regression analysis on the scores of the GAD-7 is depicted in Table 2. The results demonstrated that social-environment support total score were the factors negative correlation with GAD-7 ( $\beta = -0.24$ ,  $p < 0.01$ ). In addition, the multiple regression analysis on the scores of the four domains of WHOQOL-BREF is depicted in Table 3. The results demonstrated that social-environment support were the factors positively correlated with QoL (including physical and emotional health, social relationships, and environment) ( $\beta = 0.09$ – $0.14$ ,  $p < 0.01$ ).

### 4 | DISCUSSION

We investigated the factors related to anxiety and QoL of the Wuhan populace during the COVID-19 pandemic. After controlling for demographic variables, social-environmental support was found to be crucial for the QoL and anxiety of the Wuhan inhabitants. This study provides not only vital information for improving the mental health and QoL of the Wuhan populace but also insights into the alleviation of emotional perturbation for those being quarantined for the pandemic.

#### 4.1 | Associated factor with anxiety

The present study showed that more than half of the participants presented with mild to severe anxiety symptoms (51%). Results of post hoc tests showed that females, the elderly, and higher monthly income as well as people in poor health conditions and those with inadequate medical supplies, and shortage of basic commodities were more likely to develop anxiety (Table 1). Females were more likely to experience anxiety than males. This observation is in contrast to that of previous research that demonstrated no gender difference in the incidence of anxiety during the COVID-19 outbreak (Islam et al., 2020; Yeen Huang & Zhao, 2020). On the other hand, consistent with our results, those studies (Huang & Zhao, 2020; Islam et al., 2020) also found that women residing in areas affected by the pandemic were more prone to anxiety. Besides, the elderly and those in a poor health status (e.g., high blood pressure, diabetes) were more anxious than their younger and healthier counterparts. The reason may be their increased susceptibility to COVID-19 (Agarwal et al., 2020). The current study revealed that higher monthly income had higher anxiety level than those with lower monthly. Monthly income may be related to participants' careers, the participants with lower monthly income (below 2000) may be students, in other words they do not have a stable job or income. However, reduced job opportunities and reduced regular income from an extended furlough and a prolonged isolation are likely to adversely impact the income of inhabitants of the affected areas. This means that people who originally have stable jobs or income are vulnerable. Indeed, previous studies have shown that economic hardship could increase anxiety (Nathiya et al., 2020; Qian & Fan, 2020). In terms of social-environmental support, insufficient medical supplies (e.g., mask) and basic commodities (e.g., food) due to the coronavirus outbreak could also cause anxiety (Yeen Huang & Zhao, 2020).

Furthermore, the current study showed that the total score of the degree of social-environment support was negatively correlated with GAD-7 ( $\beta = -0.24$ ,  $p < 0.01$ ) as revealed in our multiple regression analyses (Table 2). On encountering traumatic events, social-environment support can defend against adverse health outcomes; therefore, increasing social-environment support helps reduce anxiety in a population (Bendau et al., 2020; R. Huang et al., 2013; Pouralizadeh et al., 2020; Rehman et al., 2020). Social support refers to the emotional experience and satisfaction of an individual who is respected, supported, and understood in a society (Barrera Jr, 1986). People who are quarantined at home may need more social support. During the quarantine period, communication among each other on social media as well as the verbal encouragement and support from fellow citizens may have a positive effect on reducing anxiety. Consistently, previous studies have demonstrated a positive effect of social support on alleviating anxiety, while subjective social support exerts a more direct effect on anxiety relief (Mitchell et al., 2014). Health education programs aimed at improving COVID-19 knowledge are helpful for people residents to reduce anxiety (B.-L. Zhong et al., 2020). To avoid escalation of the level of anxiety among a populace during the prolonged COVID-19 pandemic

TABLE 1 Variations in GAD-7 and SSRS scores with demographic characteristics of study participants (n = 226)

	GAD-7			
	Total	M ± SD	F/t	p-value (Post hoc)
Gender <sup>a</sup> (n, %)			-2.505	0.01*
Male (a)	157 (69.5)	4.46 ± 3.99		b > a*
Female (b)	69 (30.5)	5.90 ± 3.95		
Age <sup>b</sup> (n, %)			5.957	
20–39 (a)	162 (71.7)	4.48 ± 3.80		<0.01
40–59 (b)	55 (24.3)	5.51 ± 4.27		c > a*
≥60 (c)	9 (4)	8.78 ± 4.35		
BMI (mean ± SD)		22.8 ± 2.96		
Monthly income (Chinese yuan) <sup>b</sup> (n, %)			4.142	<0.01
Below 2000 (a)	69 (30.5)	3.41 ± 3.73		d > a*
2001–4000 (b)	28 (12.4)	6.00 ± 3.26		
4001–6000 (c)	47 (20.8)	4.87 ± 3.60		
6001–8000 (d)	46 (20.4)	5.89 ± 4.47		
Above 8001 (e)	36 (15.9)	5.67 ± 4.36		
Health status <sup>b,c</sup> (n, %)			5.764	<0.01
Very unhealthy (a)	0	0		c > e*
Unhealthy (b)	1 (4.0)	7.00 ± 0.00		
Normal (c)	10 (4.4)	9.30 ± 4.79		
Healthy (d)	60 (26.5)	5.50 ± 3.78		
Very healthy (e)	155 (68.6)	4.37 ± 3.89		
GAD-7 (mean ± SD)		4.90 ± 4.06		
WHOQOL-BREF (mean ± SD)		57.44 ± 9.03		
Social-environment support				
SSRS total scores (mean ± SD)		39.61 ± 7.75		
Enough medical supplies <sup>b</sup> (n, %)			4.344	<0.01
Not at all (a)	15 (6.6)	4.53 ± 3.20		b > e*
A little (b)	62 (27.4)	5.42 ± 4.32		c > e*
Moderately (c)	97 (42.9)	5.57 ± 4.12		
Mostly (d)	32 (14.2)	3.84 ± 3.36		
Completely (e)	20 (8.8)	2.00 ± 2.51		
Adequate basic commodities <sup>b</sup> (n, %)			5.842	<0.01
Not at all (a)	5 (2.2)	8.00 ± 7.48		c > d*
A little (b)	30 (13.3)	5.97 ± 4.00		
Moderately (c)	99 (43.8)	5.74 ± 4.00		
Mostly (d)	55 (24.3)	3.76 ± 3.5		
Completely (e)	37 (16.4)	3.05 ± 3.5		
Access to information on COVID-19 <sup>b</sup> (n, %)				
Not at all (a)	6 (2.7)	4.17 ± 3.19	1.847	0.12
A little (b)	14 (6.2)	5.43 ± 4.01		

(Continues)

TABLE 1 (Continued)

	GAD-7			
	Total	M ± SD	F/t	p-value (Post hoc)
Moderately (c)	56 (24.8)	6.00 ± 4.21		
Mostly (b)	78 (34.5)	4.77 ± 3.95		
Completely (e)	72 (31.9)	4.14 ± 3.92		
Sufficient knowledge to cope with COVID-19 <sup>b</sup> (n, %)				
Not at all (a)	2 (0.9)	5.50 ± 2.12	1.190	0.32
A little (b)	37 (16.4)	5.43 ± 4.83		
Moderately (c)	90 (39.8)	5.38 ± 3.90		
Mostly (d)	61 (27)	4.36 ± 3.52		
Completely (e)	36 (15.9)	4.03 ± 4.24		

Abbreviations: BMI, Body mass index; Gad-7, generalized anxiety disorder; SSRS, The Social Support Rating Scale; WHOQOL-BREF, World Health Organization Quality of Life-BREF.

<sup>a</sup>Independent-Samples t-test.

<sup>b</sup>One-way ANOVA and post hoc analysis using Scheffe test.

<sup>c</sup>Post hoc analysis using Kruskal–Wallis test.

$p < 0.05$ .

Model	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	B	SE	β	p
	0.18	0.16	7.89				
Gender				1.80	0.59	0.21	<0.01
Age				0.00	0.03	0.00	0.99
BMI				0.25	0.09	0.19	0.01*
Monthly income				0.49	0.21	0.18	0.02*
Health state				−0.98	0.50	0.14	0.05
Social-environment support				−0.11	0.03	−0.24	<0.01

TABLE 2 Multiple regression analysis on the scores of the GAD-7

Abbreviations: BMI: body mass index; GAD-7, generalized anxiety disorder.

$p < 0.05$ .

(Sousa et al., 2020), the government should ensure a long-term and stable supply of essential commodities and ensure the sustainability of the daily lives of the residents.

## 4.2 | Associated factor with QoL

Multiple regression analyses showed that the social-environment support (including social support and environment support) was significantly and positively correlated with the score on WHOQOL-BREF (including physical health, psychological health, social relationships, and environment) ( $\beta = 0.33\sim 0.47$ ,  $p < 0.01$ ; Table 3). This observation was consistent with the results of other studies (Li et al., 2020; White & Van Der Boor, 2020) that demonstrated a positive correlation between social-environment support and QoL. Social support includes objective support (i.e., the actual support an individual receives), subjective support (i.e., the support perceived by an individual or emotional support), and seeking social

support (i.e., a person's active pursuit of various social supports, including communicating skills, seeking assistance, and participation in activities; Rausa, 2008; Xiao, 1994). This study underscored the importance of social support for the general public in response to the psychological pressure triggered by the unexpected COVID-19 assault. The finding was supported by that of a previous study demonstrating that the care shown by others imparts a feeling of being loved and wanted that helps in alleviating the negative emotions to a certain extent (Cullen & Francis, 1994). Instead of providing one-way help or care, social support highlights the importance of social interactions, especially during a crisis when rapport building is vital. Accordingly, different types of social support and positive social behaviours that consciously and voluntarily benefit others are essential during an infectious disease outbreak (Behar, 1986) and may significantly improve the QoL of the affected individuals by reducing their sense of helplessness and boosting their confidence (S.-F. V. Wu et al., 2013). Furthermore, the lockdown in Wuhan City brought production and transportation to a halt,

**TABLE 3** Multiple regression analysis on the scores of the four domains of WHOQOL-BREF

Model	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	B	SE	β	p
Physical health	0.21	0.19	9.51				
Gender				-0.43	0.35	-0.08	0.22
Age				0.02	0.02	0.14	0.11
BMI				-0.06	0.05	-0.07	0.27
Monthly income				-0.32	0.12	-0.19	0.01*
Health state				1.08	0.29	-0.26	<0.01
Social-environment support				0.09	0.02	0.33	<0.01
Psychological health	0.25	0.23	11.91				
Gender				-0.43	0.38	-0.07	0.26
Age				0.01	0.02	0.04	0.62
BMI				-0.03	0.06	-0.03	0.62
Monthly income				-0.05	0.13	-0.03	0.71
Health state				0.84	0.32	-0.18	0.01*
Social-environment support				0.13	0.02	0.44	<0.01
Social relationships	0.29	0.27	14.71				
Gender				-0.92	0.36	-0.16	0.01*
Age				0.01	0.02	0.05	0.55
BMI				-0.10	0.06	-0.11	0.09
Monthly income				-0.04	0.13	-0.02	0.77
Health state				0.79	0.30	-0.18	0.01*
Social-environment support				0.14	0.02	0.47	<0.01
Environment	0.26	0.24	12.55				
Gender				-0.32	0.37	-0.06	0.38
Age				0.02	0.02	0.10	0.23
BMI				-0.09	0.06	-0.10	0.12
Monthly income				-0.21	0.13	-0.12	0.10
Health state				0.65	0.31	-0.15	0.04*
Social-environment support				0.14	0.02	0.47	<0.01

Abbreviations: BMI, body mass index; WHOQOL-BREF, World Health Organization Quality of Life-BREF.

*p* < 0.05.

resulting in a shortage of supplies to the households. Failure to fulfil the most basic needs for survival (e.g., food, clothing, shelter, transportation) has direct detrimental physical and mental impacts on a population living in isolation (Maslow, 1954). During the lockdown in Wuhan, the residents mainly relied on group purchase and online shopping to acquire food and medicines. In the absence of an allocation system, those who were over-concerned about the pandemic blindly stockpiled medical supplies and commodities (e.g., masks, medicines, food), resulting in insufficient public availability. A shortage or an uneven distribution of medical supplies (e.g., mask, sanitizer) in a community, in turn, would promote the spread of COVID-19 and increase the population's risk of contracting the

disease (Rieger, 2020). We found that easy accessibility to information about COVID-19 and sufficient knowledge to deal with the disease were associated with an improved QoL in terms of physiological and psychological health, social relationships, and environment-related life quality. Sufficient information and knowledge of COVID-19 are the prerequisites for establishing and promoting a positive attitude and behaviour to survive the pandemic (Hamza et al., 2020). During the lockdown, the residents of Wuhan learned about COVID-19 mainly through the media that played a pivotal role in disseminating health-related information to ease the psychological stress caused by the pandemic and guide the public to take appropriate anti-viral measures (D. H. Choi et al., 2017;



Gerbner & Gross, 1976; Lancet, 2020a). However, information from the media is a two-edged sword; while it could play a beneficial role, it may also lead to social chaos (Yamamoto et al., 2020).

Ensuring the availability of urgent medical and life-sustaining supplies in areas under assault from the pandemic through a well-planned allocation program may help in the survival of those being affected (Shrivastava & Shrivastava, 2020). The media has an essential part to play in maintaining the physical and psychological health of the public through collaborating with the government to release correct and useful COVID-19 information to boost public awareness of COVID-19 so that timely effective measures can be taken to contain the spread of the virus on the one hand, while avoiding panic and chaos on the other (M.-W. Lin & Cheng, 2020).

## 5 | LIMITATIONS

This study had some limitations. First, the cross-sectional design of this study precluded causal inferences from the data. Second, our findings, which were focused on the Wuhan populace, may not be extrapolated to populations of other ethnical, geographical, cultural, and economic backgrounds. A large-scale study with international coverage is warranted to explore the impact of the pandemic on the mental health and QoL of those directly or indirectly affected. Third, due to the sudden onset of the pandemic, the psychological condition and QoL of the affected individuals before the outbreak could not be assessed. Fourth, the relatively young and healthy population from whom most data of this study were collected may contribute to sampling bias. Fifth, because there was no validated scale for the evaluation of COVID-19-related impacts on the psychological status and QoL at the time of this study, our data were based on the established instruments. The availability of recently introduced assessment tools (e.g., Fear of COVID-19 Scale, Coronavirus Anxiety Scale, Obsession with COVID-19 Scale, and COVID Stress Scales) (Ahorsu et al., 2020; E. Choi et al., 2020; Taylor et al., 2020) may provide more specific information on this topic. Sixth, the low R-squared values of the regression model for both anxiety and QoL in this study need to be verified in further large-scale studies because both variables can be influenced by different factors. Seventh, although it has been reported that there is no significant difference in reliability between questionnaires in electronic and paper forms (Murray & Fisher, 2002), the need for electronic devices for completing the electronic questionnaire may introduce potential bias to this study. Eighth, our study employed an anonymous questionnaire, although controlling for demographic variables, the participants' demographics might still influence our findings such as participant's career, which limits our interpretation of outcome. Despite the aforementioned limitations, the current study, which provided findings related to the factors associated with anxiety and QoL of the Wuhan populace during the COVID-19 pandemic, may serve as a reference for improving the mental health and QoL of those being affected by the pandemic.

## 6 | CONCLUSIONS

Our findings showed that, in Wuhan where the first COVID-19 outbreak occurred, enhancing social support and provision of adequate basic commodities could effectively reduce the level of anxiety among its residents. Besides, enhancing social-environment support, provision of adequate basic commodities and medical supplies, improving accessibility of COVID-19-related information, and reinforcing public knowledge to take appropriate precautions against viral spread could improve the QoL of the inhabitants.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## ETHICS STATEMENT

This study was approved by the Research Ethics Center of China Medical University and Affiliated Hospital (CRREC-109-077).

## DATA AVAILABILITY STATEMENT

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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