



Article

Emotional Distress and Associated Factors among the General Population during the COVID-19 Pandemic in China: A Nationwide Cross-Sectional Survey

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Abstract: Objective: This study investigated emotional distress and associated factors among the general population in the aftermath of the COVID-19 lockdown in China. Design and sample: An online nationwide survey was conducted using a self-designed questionnaire, which included items related to demography, lifestyle, and experience of emotional distress during the previous month of the pandemic period. A total of 10,545 respondents completed the survey. Results: Over 30% of participants reported experiencing one or more symptoms of emotional distress to a moderate or higher degree. Increased emotional distress was associated with COVID-19-related impact on diet ($\beta = -1.106$, 95% CI: -1.187 to -1.026 , $p < 0.001$), experiencing food shortage ($\beta = 1.334$, 95% CI: 1.117 to 1.551 , $p < 0.001$), lack of physical exercise ($\beta = -0.845$, 95% CI: -1.024 to -0.667 , $p < 0.001$), younger age ($\beta = -0.050$, 95% CI: -0.062 to -0.039 , $p < 0.001$), being a smoker ($\beta = 0.852$, 95% CI: 0.604 to 1.100 , $p < 0.001$), lower education level ($\beta = -0.524$, 95% CI: -0.702 to -0.346 , $p < 0.001$), and lack of medical insurance ($\beta = -0.742$, 95% CI: -1.012 to -0.473 , $p < 0.001$). Emotional distress was negatively associated time spent sleeping ($\beta = -0.020$, 95% CI: -0.027 to -0.013 , $p < 0.001$). Conclusion: The levels of emotional distress are high in the aftermath of the lockdown and associated with a number of demographic and lifestyle factors.

Keywords: COVID-19; emotional distress; sleep; general population; survey



Citation: Yang, L.; Sun, J.; Wang, D.; Rahman, A.; Shi, Z.; Wang, Y.; Li, X. Emotional Distress and Associated Factors among the General Population during the COVID-19 Pandemic in China: A Nationwide Cross-Sectional Survey. *COVID* **2022**, *2*, 261–272. <https://doi.org/10.3390/covid2030021>

Academic Editor: Andrea Fiorillo

Received: 11 January 2022

Accepted: 4 March 2022

Published: 9 March 2022

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1. Introduction

Coronavirus disease 2019 (COVID-19) rapidly spread worldwide and became a global pandemic after it was first reported in Wuhan City, Hubei Province, China, in late December 2019 [1,2]. In response to the pandemic, most of the affected countries implemented a lockdown policy, which suspended or restricted public transport, prohibited gatherings, and limited nonessential social interactions, in an attempt to reduce transmission of the virus [3,4]. This unprecedented global lockdown has been referred to as the largest quarantine in human history, and billions of people around the world were restricted to their homes. As a result, there is rising concern that the pandemic has had a significant influence on public mental health.

Previous studies have suggested that similar outbreaks of infectious diseases in recent years, including severe acute respiratory syndrome (SARS), H1N1 influenza, and Middle East respiratory syndrome (MERS), were associated with various mental health problems,

such as anxiety, depression, post-traumatic stress symptoms (PTSS), stigmatization, abandonment, and isolation in the general population, which persisted over time [5–7]. The current COVID-19 pandemic appears to have had a similar impact on the mental health of the general population [8]. To better understand its impact, an increasing number of studies have been conducted to explore the prevalence of mental health concerns among the general population and identify its influencing factors. For instance, two cross-sectional studies during the COVID-19 outbreak in China showed high levels of psychological distress [9] and a sharp increase in the prevalence of anxiety and depression among the general population [10]. Another cross-sectional study during the initial stage of COVID-19 in Spain also revealed a high prevalence of depression, anxiety, and post-traumatic stress disorder (PTSD) among the general population and various specific groups [11].

Increased psychological distress was associated with the COVID-19 pandemic and lockdown measures [12]. An investigation in Belgium showed that half of the participants displayed psychological distress in the early stage of the COVID-19 lockdown, with women and young people displaying the highest levels of psychological distress [13]. A longitudinal study in Italy showed that individuals exhibited higher levels of anxiety throughout most of the lockdown period [14]. Several factors, such as socioeconomic and gender disparities, were found to be associated with psychological distress during the COVID-19 pandemic [15]. In a large national survey during the lockdown in China (January to March 2020), 35% of respondents were found to be suffering from emotional distress [16]. A key question is whether the levels of distress in Chinese people would be sustained in the aftermath of the immediate emergency and lockdown situation, and what factors might contribute to sustained levels of distress.

In addition, a growing body of evidence has documented the impact of the COVID-19 on sleep [17]. A systematic review estimated that the prevalence of sleep problems during the COVID-19 pandemic was high and affected approximately 40% of people from general and health care populations [18]. A longitudinal study observed longer sleep latency, worse sleep efficiency, and massive sleep medication use, but an increased sleep duration and better daytime functioning, in Italian participants during the COVID-19 lockdown [19,20]. Moreover, the increase in sleep difficulties was associated with higher levels of depression, anxiety, and stress among Italian adults during the lockdown [21].

To fully understand the psychological effects of the current pandemic, it is critical to conduct surveys of emotional distress at the population level at various time points. In the present study, we aimed to conduct an online nationwide survey on the emotional distress and the associated factors among the general population in the aftermath of the lockdown due to the COVID-19 outbreak in China. We mainly hypothesized that a large proportion of the general population in China experienced emotional distress in the aftermath of the COVID-19 lockdown, and that was influenced by a variety of factors.

2. Materials and Methods

2.1. Study Design and Participants

An anonymous online survey was carried out nationally in mainland China from 25 April to 11 May 2020. Potential participants were recruited by sending the survey through WeChat, the most popular social media outlet in China. The final sample was obtained through both snowball and convenience sampling methods and included members of the general population living in mainland China during the COVID-19 outbreak. Researchers first disseminated the survey to their WeChat friends, and respondents were encouraged to invite new respondents from their contacts. The survey was anonymous and did not collect any personal information, such as names, to obtain honest responses. Each part of the questionnaire had a minimum time requirement to ensure that participants answered the questions carefully. The questionnaire could be submitted only after all the questions had been answered. This study was approved by the Ethical Committee of the Health Science Center, Xi'an Jiaotong University in July 2020 (Number: 2020-1172).

2.2. Measures

This study used a self-designed questionnaire consisting of the following parts: (1) general demographic characteristics, including gender, age, ethnicity, education, marital status, medical insurance, residence, and employment status; (2) lifestyle variables, including smoking and drinking, diet, and physical exercise; and (3) emotional distress and daily sleep duration. The primary outcome was emotional distress assessed by a 5-item scale measuring participants' "stressful experiences" during the previous month of the pandemic period. It was adapted from the widely used and validated DSM-IV-based civilian version of the posttraumatic stress disorder checklist (PCL-C) [22]. The scale includes questions about how much participants experienced and were bothered by (1) losing interest in previously enjoyed activities; (2) repeated disturbing dreams related to COVID-19; (3) difficulty falling asleep or staying asleep or waking up frequently; (4) becoming irritable or angry easily; and (5) difficulty concentrating. Each question was answered by selecting from the following 5 options: not at all (1 point), a little bit (2 points), moderate (3 points), quite a bit (4 points), and extremely (5 points), using a 5-point Likert scale. The total score of emotional distress was the sum of the five items, ranging from 5 to 25. A higher score represented a great impact and worse emotional status.

2.3. Statistical Analyses

Descriptive statistics were calculated for the demographic characteristics, lifestyle, emotional distress, and daily sleep duration of the participants. Continuous variables are presented as means and standard deviation (SD), and categorical variables are presented as numbers with percentages. The independent-sample *t*-test and ANOVA were used to compare sleep duration and emotional distress among different groups according to demographic characteristics and lifestyle variables, as appropriate. A multivariate linear regression model was used to assess the associated factors of emotional distress among participants. In addition, Pearson's correlation analysis and a multivariate linear regression model were used to explore the association between emotional distress and sleep duration. The statistical analyses were using SPSS Statistics software, version 19.0 (IBM, Chicago, IL, USA). A two-tailed *p*-value less than 0.05 was regarded as statistically significant for all tests.

3. Results

3.1. Basic Information of Participants

In total, 10,545 participants completed the online survey, and they were from all 31 provinces, autonomous regions, and municipalities in mainland China. By geographical regions, 1511 (14.3%) participants were in Western China, 3117 (29.6%) were in Central China, and 5917 (56.1%) were in Eastern China. The mean age of the participants was 31.8 ± 9.9 years; 43.7% were male and 56.3% were female. Detailed information on the demographic and lifestyle characteristics of the participants is presented in Table 1.

Table 1. Basic characteristics of participants ($n = 10,545$).

Characteristics	<i>n</i> (%)
Demographic	
Age (years)	
≤20	940 (8.5)
21~40	7763 (73.6)
41~60	1741 (16.5)
≥61	101 (1.0)
Ethnicity	
Han Chinese	9942 (94.3)
Others	603 (5.7)

Table 1. Cont.

Characteristics	<i>n</i> (%)
Demographic	
Education	
Primary school or below	191 (1.8)
Middle–high school	3985 (37.8)
University or above	6369 (60.4)
Marital status	
Unmarried	3427 (32.5)
Married	6545 (62.1)
Cohabiting	365 (3.5)
Widowed	64 (0.6)
Divorced or separated	144 (1.4)
Medical insurance	
Yes	9238 (87.6)
No	1307 (12.4)
Residence	
City	6493 (61.6)
Town	2470 (23.4)
Rural	1582 (15.0)
Employment status	
Student	2075 (19.7)
Employed	7015 (66.5)
Unemployed	1135 (10.8)
Retired	320 (3.0)
Lifestyle	
Smoking	
Yes	1633 (15.5)
No (including those who quit smoking)	8912 (84.5)
Drinking	
Yes	2354 (22.3)
No (including those who quit drinking)	8191 (77.7)
COVID-19 impact on diet	
Great impact	1467 (13.9)
Some impact	3538 (33.6)
General	2334 (22.1)
Minimal impact	2307 (21.9)
Not at all	899 (8.5)
Experienced food shortage during COVID-19	
Yes	2837 (26.9)
No	7708 (73.1)
Participated in physical exercise during COVID-19	
Yes	6362 (60.3)
No	4183 (39.7)
Emotional distress	
Lost interest in previously enjoyed activities	
Not at all	4090 (38.8)
A little bit	3236 (30.7)
Moderate	1823 (17.3)
Quite a bit	952 (9.0)
Extremely	444 (4.2)
Repeated disturbing dreams related to COVID-19	
Not at all	4179 (39.6)
A little bit	3150 (29.9)
Moderate	1941 (18.4)
Quite a bit	916 (8.7)
Extremely	359 (3.4)
Difficulty falling asleep or staying asleep or waking up frequently	
Not at all	4294 (40.7)
A little bit	3027 (28.7)
Moderate	1850 (17.5)

Table 1. *Cont.*

Characteristics	n (%)
Emotional distress	
Quite a bit	1007 (9.5)
Extremely	367 (3.5)
Becoming irritable or angry easily	
Not at all	4191 (39.7)
A little bit	2987 (28.3)
Moderate	2004 (19.0)
Quite a bit	994 (9.4)
Extremely	369 (3.5)
Difficulty concentrating	
Not at all	3884 (36.8)
A little bit	3082 (29.2)
Moderate	2022 (19.2)
Quite a bit	1130 (10.7)
Extremely	427 (4.0)

3.2. Comparison of the Emotional Distress and Sleep Duration

Over 30% of participants reported experiencing at least one symptom of mental distress at a moderate level or higher (Figure 1). The average total score of emotional distress among all participants was 10.46 ± 4.90 points. As shown in Table 2, there were significant differences in emotional distress with respect to demographic and lifestyle variables (all $p < 0.001$). Emotional distress scores decreased with age and education. Men scored higher on emotional distress scores than women. Smokers and drinkers scored significantly higher than nonsmokers and non-drinkers, respectively. Participants who exercised during the pandemic had significantly lower emotional distress scores than those who did not.

The average daily sleep duration for all participants was 7.6 ± 1.7 h. There were significant differences in sleep duration with respect to age, gender, education, marital status, residence, employment status, and all lifestyle variables (all $p < 0.001$), but there were no significant differences with respect to ethnicity ($p = 0.188$) or medical insurance ($p = 0.316$) (Table 2). The average daily sleep duration reduced with age but increased with education. The daily sleep duration of smokers and drinkers was significantly lower than that of non-smokers and non-drinkers, respectively. Those who experienced food shortages had significantly higher emotional distress scores and a lower daily sleep duration than those who did not experience food shortages during the pandemic.

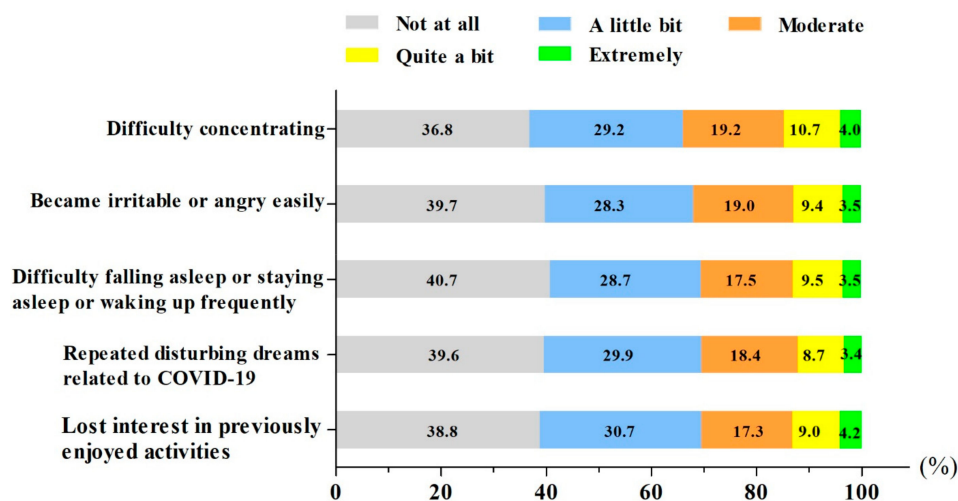


Figure 1. Experience of emotional distress among the general population during the COVID-19 pandemic in China ($n = 10,545$).

Table 2. Comparison of emotional distress and daily sleeping time according to demographic and lifestyle characteristics ($n = 10,545$).

Variables	Emotional Distress (X ± SD)	t/F	p-Value	Sleeping Time (X ± SD)	t/F	p-Value
Demographic						
Age (years)		53.264	<0.001		31.714 **	<0.001
≤20	11.07 ± 5.15			7.84 ± 1.82		
21~40	10.69 ± 4.98			7.65 ± 1.74		
41~60	9.23 ± 4.18			7.33 ± 1.49		
≥61	8.56 ± 3.97			6.73 ± 1.30		
Gender		8.320	<0.001		−4.897 *	<0.001
Male	10.92 ± 5.12			7.51 ± 1.87		
Female	10.11 ± 4.69			7.68 ± 1.57		
Ethnicity		−3.217	0.001		1.317 *	0.188
Han Chinese	10.42 ± 4.87			7.61 ± 1.69		
Others	11.13 ± 5.27			7.50 ± 1.94		
Education		37.745	<0.001		12.006 **	<0.001
Primary school or below	12.08 ± 5.87			7.14 ± 2.73		
Middle–high school	10.88 ± 5.13			7.55 ± 1.90		
University or above	10.16 ± 4.68			7.65 ± 1.53		
Marital status		51.229	<0.001		50.300 **	<0.001
Unmarried	10.78 ± 4.89			7.87 ± 1.71		
Married	10.12 ± 4.79			7.52 ± 1.62		
Cohabiting	13.60 ± 5.33			6.80 ± 2.62		
Widowed	11.58 ± 5.67			7.18 ± 1.65		
Divorced or separated	10.19 ± 4.89			7.10 ± 1.69		
Medical insurance		−7.214	<0.001		−1.002 *	0.316
Yes	10.33 ± 4.82			7.60 ± 1.66		
No	11.45 ± 5.31			7.66 ± 2.06		
Residence		3.244	0.039		18.041 **	<0.001
City	10.39 ± 4.89			7.53 ± 1.66		
Town	10.49 ± 4.85			7.66 ± 1.66		
Rural	10.74 ± 4.98			7.81 ± 1.95		
Employment status		13.008	<0.001		30.398 **	<0.001
Student	10.59 ± 4.82			7.85 ± 1.79		
Employed	10.35 ± 4.91			7.56 ± 1.62		
Unemployed	11.18 ± 4.97			7.61 ± 1.92		
Retired	9.63 ± 4.61			6.98 ± 2.02		
Lifestyle						
Smoking		13.612	<0.001		−7.967 *	<0.001
Yes	12.15 ± 5.58			7.21 ± 2.24		
No (including those who quit smoking)	10.16 ± 4.70			7.68 ± 1.58		
Drinking		7.964	<0.001		−3.868 *	<0.001
Yes	11.19 ± 5.07			7.47 ± 1.99		
No (including those who quit drinking)	10.26 ± 4.83			7.64 ± 1.62		
COVID-19 impact on diet		355.018	<0.001		18.514 **	<0.001
Great impact	13.03 ± 5.78			7.25 ± 2.38		
Some impact	11.49 ± 4.70			7.66 ± 1.70		
General	10.31 ± 4.37			7.65 ± 1.56		
Minimal impact	8.63 ± 4.13			7.63 ± 1.40		
Not at all	7.33 ± 3.64			7.73 ± 1.44		
Experienced food shortage during COVID-19		26.105	<0.001		−4.731 *	<0.001
Yes	12.56 ± 5.14			7.46 ± 2.08		
No	9.69 ± 4.57			7.66 ± 1.55		
Participated in physical exercise during COVID-19		−4.460	<0.001		−6.340 *	<0.001
Yes	10.29 ± 4.90			7.52 ± 1.73		
No	10.73 ± 4.88			7.73 ± 1.68		

* Independent sample *t*-test; ** ANOVA.

3.3. Multivariate Linear Regression Analyses of Influencing Factors of Emotional Distress

Table 3 shows the stepwise multivariate linear regression analyses of emotional distress. The independent variable codes are shown in Table A1 in Appendix A. The results revealed that increased emotional distress scores were associated with increased levels of the pandemic’s impact on diet ($\beta = -1.106$, 95% CI: -1.187 to -1.026 , $p < 0.001$), food shortages ($\beta = 1.334$, 95% CI: 1.117 to 1.551 , $p < 0.001$), not participating in physical exer-

cise ($\beta = -0.845$, 95% CI: -1.024 to -0.667 , $p < 0.001$), younger age ($\beta = -0.050$, 95% CI: -0.062 to -0.039 , $p < 0.001$), being a smoker ($\beta = 0.852$, 95% CI: 0.604 to 1.100 , $p < 0.001$), lower education level ($\beta = -0.524$, 95% CI: -0.702 to -0.346 , $p < 0.001$), and not having medical insurance ($\beta = -0.742$, 95% CI: -1.012 to -0.473 , $p < 0.001$). Compared with participants who were married, those who were unmarried ($\beta = 0.404$, 95% CI: 0.146 to 0.663 , $p = 0.002$) or cohabiting ($\beta = 1.881$, 95% CI: 1.389 to 2.372 , $p < 0.001$) had higher emotional distress scores. Students had lower emotional distress scores ($\beta = -0.535$, 95% CI: -0.821 to -0.250 , $p < 0.001$) than participants who were employed.

Table 3. Multivariate linear regression analyses of influencing factors of emotional distress.

Variables	Coefficients (β)	95% CI	p-Value
Constant	16.989	(16.270, 17.707)	<0.001
Marriage status (vs. married)			
Unmarried	0.404	(0.146, 0.663)	0.002
Cohabiting	1.881	(1.389, 2.372)	<0.001
Widowed	1.072	(-0.038, 2.181)	0.058
Divorced or separated	0.338	(-0.403, 1.078)	0.371
Residence (vs. city)			
Town	0.130	(-0.084, 0.344)	0.235
Rural	-0.008	(-0.272, 0.256)	0.955
Employment status (vs. employed)			
Student	-0.535	(-0.821, -0.250)	<0.001
Unemployed	0.215	(-0.083, 0.514)	0.157
Retired	0.389	(-0.154, 0.931)	0.160
COVID-19 impact on diet	-1.106	(-1.187, -1.026)	<0.001
Experienced food shortage (vs. no)	1.334	(1.117, 1.551)	<0.001
Participated in physical exercise (vs. no)	-0.845	(-1.024, -0.667)	<0.001
Age (year)	-0.050	(-0.062, -0.039)	<0.001
Smoking (vs. non-smoking)	0.852	(0.604, 1.100)	<0.001
Education *	-0.524	(-0.702, -0.346)	<0.001
Medical insurance (vs. no insurance)	-0.742	(-1.012, -0.473)	<0.001

* Education level was treated as ranked data and included in the regression analyses as a numerical variable.

3.4. Association between Emotional Distress and Daily Sleep Duration

Pearson’s correlation analysis showed that the correlation coefficient between the emotional distress score and daily sleep duration was -0.065 ($p < 0.001$). As shown in Table 4, multivariate linear model analyses revealed that the emotional distress scores were significantly negatively associated with daily sleep duration ($\beta = -0.023$, 95% CI: -0.029 to -0.016 , $p < 0.001$). The results remained statistically significant after adjustment for age, gender, ethnicity, education, marital status, medical insurance, residence, and employment status (Model 1) ($\beta = -0.024$, 95% CI: -0.030 to -0.017 , $p < 0.001$) and remained statistically significant after further adjustment for smoking, drinking, the pandemic’s impact on diet, food shortages, and physical exercise (Model 2) ($\beta = -0.020$, 95% CI: -0.027 to -0.013 , $p < 0.001$).

Table 4. Multivariate association analyses of emotional distress and daily sleeping time.

Variables	Daily Sleeping Time		
	Coefficients (β)	95% CI	p-Value
Emotional distress score			
Pre-adjustment	-0.023	(-0.029, -0.016)	<0.001
Model 1	-0.024	(-0.030, -0.017)	<0.001
Model 2	-0.020	(-0.027, -0.013)	<0.001

Model 1 was adjusted for age, gender, ethnicity, education, marital status, medical insurance, residence, and employment status; Model 2 was adjusted for the variables in Model 1 plus smoking, drinking, COVID-19’s impact on diet, food shortage, and participating physical exercise during COVID-19.

4. Discussion

The public suffered varying degrees of psychological stress during the public health emergency due to COVID-19. In February and March of 2020, all healthy Chinese residents throughout the nation were required to stay at home and maintain strict social distancing [23]. This strict lockdown policy resulted in cognitive distress, negative emotions, and reduced sleep quality in the general population [24]. The quarantine has proved to be associated with psychological distress and a high prevalence of mental health symptoms [25]. The present nationwide survey enrolled 10,545 participants from 25 April to 11 May 2020, in the immediate aftermath of the strict lockdown. Our main findings were that levels of emotional distress remained high and were associated with a number of demographic and lifestyle factors.

Anxiety and depressive symptoms were the most common mental problems experienced during this pandemic [9,10,26–29]. A longitudinal survey in the initial stage of the COVID-19 outbreak in China (31 January to 2 February 2020) showed that more than half of the respondents from the general population rated the psychological impact of the pandemic as moderate or severe, 28.8% of participants reported moderate to severe anxiety symptoms, 16.5% reported moderate to severe depressive symptoms, and 8.1% reported moderate to severe stress levels [27]. No significant changes in anxiety, depression, or stress levels were found in the second survey during the peak (28 February to 1 March 2020) of the COVID-19 outbreak in China [28]. Similar findings were observed in the initial stage of the COVID-19 outbreak in Spain, with 18.7% of the general population reporting depressive symptoms, 21.6% reporting anxiety, and 15.8% reporting PTSD symptoms [11]. All these findings suggest that a significant proportion of the general population experienced psychological distress during the pandemic. Therefore, promoting appropriate support is crucial to reduce emotional distress and promote the psychological well-being of the general population.

We found that emotional distress scores in the general population varied by the demographic and lifestyle factors measured. Multivariate analyses showed that participants with younger age, lower education level, and no medical insurance had increased emotional distress. A study showed that young adults were more vulnerable to being impacted by the COVID-19 lockdown [30]. Younger people tended to have increased emotional distress, potentially because of greater exposure to social media, which could easily trigger stress [16,31]. In this study, a higher education level was negatively associated with emotional distress. The opposite result was found in a previous study, in which people with higher education tended to report more distress in earlier surveys [16]. Thus, the role of education in modulating emotional distress is unclear. It is easier to understand that participants without medical insurance would show increased emotional distress due to the potential financial burden from illness. Married people showed less emotional distress than those who were unmarried and cohabiting, which was in line with the results of a previous study [9]. In unmarried people, the lack of a major social support system was suggested to mediate psychological distress [32]. In addition, a systematic review showed that living in rural areas and having a lower socioeconomic status was associated with higher anxiety odds [15]. However, our results showed that there was no urban/rural difference regarding emotional distress.

The implementation of lockdowns caused shortages of some kinds of food in markets because of panic buying and disruptions to the food supply. In this study, 26.9% of participants experienced food shortages during the COVID-19 outbreak. Moreover, being forced to stay indoors for a long time caused dramatic changes in people's daily lifestyles and behaviors. Some studies have suggested that dietary habits have changed considerably during the pandemic in Spanish and Italian populations [33,34]. Our multivariate analyses revealed that experiencing a higher level of COVID-19's impact on diet and food shortages during the pandemic were associated with increased emotional distress. In addition, participants who were smokers and did not participate in physical exercise showed higher

levels of emotional distress. Recommendations for better dietary habits, exercise, and sleep were proposed in response to pandemic situations [35].

Stress from the COVID-19 situation has a negative impact on sleep. Recent studies have shown that 18.2% of the general population reported poor sleep quality, and 34.0% of health care workers reported symptoms of insomnia during the pandemic [29,36]. A systematic review showed that the global pooled prevalence of sleep problems among all populations was 35.7% during the pandemic [18]. Sleep plays an important role in emotion regulation, and sleep disturbances can negatively affect both physical and mental health. Lower quality sleep and insomnia were correlated with depressive symptoms, feelings of loneliness and anxiety, and a more negative mood during the pandemic and quarantines [17]. A study also showed that participants with better sleep quality and fewer early morning awakenings reported fewer PTSD symptoms during the COVID-19 outbreak [37]. Our results showed that emotional distress was negatively associated with daily sleep duration, suggesting that daytime emotional status can also affect nighttime sleep. Thus, paying attention to sleep is vital for the well-being of the general population during the COVID-19 pandemic.

Our study has several limitations. One is that this study was designed as a web-based survey through social media using the non-random snowball sampling method, and the participants needed to have a smartphone and be able to use WeChat. As with many internet surveys, the results are also limited by a lack of information about response rates and differences between respondents and nonrespondents [38]. As a result, our results may be subject to potential selection bias. Another limitation is that this study used a self-designed questionnaire to assess the impact of COVID-19 on the public's emotional status. As a result, we cannot estimate the prevalence of emotional distress, and the findings need to be verified by questionnaires with proven validity. In addition, this is an observational study, and observed differences may be still subject to unobserved confounding factors that we could not control for in the analyses.

Despite some methodological limitations, this study was able to determine the huge emotional impact of COVID-19 on the general population in China. Addressing mental health in public health emergencies is important. Mental health professionals have vital responsibilities in providing mental support to the population [39]. The World Health Organization (WHO) and others have proposed a series of strategies to strengthen mental health care in countries experiencing and recovering from COVID-19 [40]. In addition, it is important for all countries to develop mid- to long-term support plans to respond to the mental health consequences of the pandemic [41].

5. Conclusions

In conclusion, this study revealed a great emotional impact among the general population caused by the COVID-19 outbreak and associated lockdown in China. Marriage status, employment status, COVID-19's impact on diet, food shortages, participation in physical exercise, age, smoking, education, and medical insurance were the influencing factors of emotional distress among the general population. In addition, the public's emotional distress was negatively associated with daily sleep duration. Our findings suggest that the emotional status of the general population needs further attention during the COVID-19 pandemic. Further research is needed to evaluate the long-term mental consequences of COVID-19 and the lockdown, taking into account the severity of COVID-19 prevalence and varying suppression measures in different countries.

Author Contributions: L.Y.: study conception and design, data collection, data analysis and interpretation, drafting of the article; J.S.: data collection, data analysis and interpretation; D.W.: study conception and design, data collection, data analysis and interpretation, critical revision of the article; A.R.: critical revision of the article; Z.S.: critical revision of the article; Y.W.: study conception and design, funding acquisition; X.L.: study conception and design, validation. All authors have read and agreed to the published version of the manuscript.

Funding: The project was supported in part by research grants from the China Medical Board (Grant Number: 16-262), the University Alliance of the Silk Road (Grant Number: 2020LMZX002), and Xi'an Jiaotong University Global Health Institute.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethical Committee of Health Science Center, Xi'an Jiaotong University in July 2020 (Number: 2020-1172).

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: The datasets used and/or analyzed during this study are available from the corresponding author on reasonable request.

Acknowledgments: The authors thank all participants in this study for their participation and cooperation. We thank Guorui Ruan, Lihua Yan, and Bingtong Zhao for their special assistance in supporting this project.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. The independent variable codes in the stepwise multiple linear regression model.

Variables	Value Codes
Age	Numerical variable (year)
Gender	Dummy variable: Male = 1; Female = 0
Ethnicity	Dummy variable: Han Chinese = 1; others = 0
Education	Numerical variable: Primary school or below = 1; Middle-high school = 2; University or above = 3
Marital status	Categorical variable: Married = 1; Unmarried = 2; Cohabiting = 3; Widowed = 4; Divorced or separated = 5
Medical insurance	Dummy variable: Yes = 1; No = 0
Residence	Categorical variable: City = 1; Town = 2; Rural = 3
Employment status	Categorical variable: Employed = 1; Student = 2; Unemployed = 3; Retired = 4
Smoking	Dummy variable: Yes = 1; No (including those who quit smoking) = 0
Drinking	Dummy variable: Yes = 1; No (including those who quit drinking) = 0
COVID-19 impact on diet	Numerical variable: Great impact = 1; Some impact = 2; General = 3; Minimal impact = 4; Not at all = 5
Experienced food shortage	Dummy variable: Yes = 1; No = 0
Participated in physical exercise	Dummy variable: Yes = 1; No = 0
Daily sleeping time	Numerical variable (hours)

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