

Investigation of PTSD during the Coronavirus Epidemic

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ABSTRACT

Aim: We investigated to understand post-traumatic stress disorder (PTSD) during the coronavirus epidemic, and related influential factors. We hoped to provide more basis for targeted services to improve public psychological health care.

Methods: From the psychological aid platform set up by the Wuhan Mental Health Center, we obtained online sample data of Chinese residents during the coronavirus epidemic. We used the PTSD examination scale as the study tool and analyzed the data with SPSS.

Results: A total of 376 data was collected. The PTSD degree of the public was 45.93 ± 17.32 , the positive detection rate was 63.56%, and the PTSD level increased with fluctuation. Participants' gender, educational level, and location were the influential factors. Specifically, women, lower educational backgrounds, and people in Wuhan were more likely to have PTSD.

Conclusions: The epidemic had a great impact on people's psychological status. Although the epidemic has basically been brought under control, PTSD levels have not declined. Therefore, it is necessary to provide timely psychological assistance for people in need, and help them adapt to life as soon as possible.

Keywords: COVID-19; post-traumatic stress disorder; influence factors; timeline changes

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The population began to realize that assistance was limited, and under various pressures, with continued stress and fatigue, various problems became increasingly prominent.

The 2019 Novel Coronavirus (abbreviated as COVID-19) is a new, highly infectious respiratory disease. Since the outbreak of novel coronavirus, it has not only affected people's physiological health, including many clinical symptoms like fever, dry cough, fatigue, muscle pain, and dyspnea, but has also caused great harm to people's mental health, triggering the prevalence of stress, anxiety, and depression among the general population (Bao et al., 2020; Wang et al., 2020). Previous studies have shown that public health emergencies would cause a series of emotional problems (Wang et al., 2003), so we need to pay attention to the problems that occurred during COVID-19. Since the outbreak of the epidemic, the Chinese government took strong measures to control the rapid spread of COVID-19 in China. During the Wuhan lockdown, residents were required to stay home and avoid contact with others (Zhong et al., 2020). As a result of continuous efforts, significant effects have been achieved, and the epidemic has entered a stage of stabilization. However, the experience of the epidemic, the exposure to media information, and the perception of epidemic risk have all affected the population's mood [Dong et al., 2020]. Therefore, people's mental health problems cannot be ignored.

The sudden outbreak of COVID-19 is a serious traumatic event for people all over the world. Epidemiological evidence showed that about 5–12% of people may develop post-traumatic stress disorder (PTSD) after suffering from traumatic events (Ursano et al., 2009). As the epidemic continues to develop, people's stress response to the COVID-19 outbreak may still exist. Studies have been conducted to investigate this situation (Xu et al., 2020; Liu et al., 2020). However, to date, few studies have conducted longitudinal surveys on PTSD for the general population. For that reason, this study analyzed the data collected from March 1 to May 1, 2020 during the epidemic, hoping to obtain data on the changing trend of PTSD and related influential factors, and to better understand the longitudinal psychological changes of the general population. Based on this study, we hope that psychological interventions can be carried out more effectively in the later stages of the pandemic.

On March 9, 2020, a research team extracted the data of Wuhan COVID-19 patients from the infectious disease reporting system for the period of December 2019 to March 8, 2020. They divided this data into five stages [Pan et al., 2020]. This research showed that the daily confirmed case rate per million population in Wuhan continued to increase during the first to third stages, and declined during the fourth to fifth stages. This study showed that due to strong prevention and control measures, the epidemic entered a stable stage in March 2020. Since then, the Wuhan mobile hospitals were closed one after another. The last one was closed on March 10, 2020 indicating that the epidemic had been brought under control. This study referred to this article, and intended to divide the data collected in this study into two phases, namely the "peak period" and the "late epidemic period." March 10 is the dividing point, with the period before March 10 being the "peak period," followed by a "late epidemic period." By comparing the psychological conditions of these two periods, we can better understand people's mental health after the epidemic was contained.

Methods

Participants

In order to better help people in need, the Wuhan Mental Health Center set up a psychological aid platform during this special period. This survey research collected data online through this platform. Research participants were those who contacted the platform and voluntarily provided relevant information from March 1 to May 1, 2020. Participants were informed through WeChat, Weibo, and other channels. The investigation was approved by the Ethics Committee of Wuhan Mental Health Center. All participants were informed of the purpose of the investigation, volunteered to participate, and signed the online informed consent.

Research Tools

■ General information questionnaire

A self-compiled general data questionnaire was used, which included the subjects' gender, age, population classification, education level, physical condition, and current place of residence.

■ Post-traumatic Stress Disorder Checklist (PCL)

The Post-traumatic Stress Disorder Checklist (PCL) is a self-rating scale developed by Weathers (1993) that includes 17 items divided into 3 main dimensions: re-experience, avoidance/emotional numbness, and high alertness. These questions are answered on a scale of 1–5: 1 = not at all, 2 = slightly, 3 = moderately, 4 = very, and 5 = extremely. The total score ranges from 17 to 85. The higher the score, the more severe the PTSD. A total score between 38 and 49 indicates that people may have certain PTSD symptoms, while a score greater than 50 indicates obvious PTSD symptoms. The retest reliability of the scale is 0.96, and the internal consistency reliability is 0.94 (Liu et al., 2015), which indicates that the questionnaire has good reliability and validity.

Statistical Methods

In this study, SPSS 21.0 was used to analyze the collected data. The frequencies of demographic variables were described. The scores of PTSD were compared according to demographic characteristics with independent samples t test, one-way analysis of variance (ANOVA). Multivariable linear regression analysis using all of the demographic variables as independent variables, with PTSD score as the dependent variable, was conducted to identify factors associated with PTSD. In addition, we drew a trend change graph of PTSD on a weekly basis.

Results

Demographic characteristics of participants

In this survey, 390 questionnaires were collected. After excluding the invalid ones, there were 376 valid questionnaires, with an effective rate of 96.3%. In the final sample, the analysis of the distribution of demographic variables showed that the average age was 27.2 years old (ranging from 12 to 60), 294 (78.2%) of participants were women, 271 (72.1%) had associate or bachelor's degrees, and 308 (81.9%) were Hubei (including Wuhan) residents. Other demographic characteristics are shown in Table 1.

Differences in PTSD demographic variables and its dimensions

Results of the analysis of gender differences in PTSD total scores and its three different dimensions during COVID-19 showed that there were significant differences

Table 1 Demographic characteristics of participants (n = 376)

| Characteristics | Number of participants | Ratio |
|---------------------------------------|------------------------|-------|
| <i>Gender</i> | | |
| ■ Male | 82 | 21.8% |
| ■ Female | 294 | 78.2% |
| <i>Age-group</i> | | |
| ■ 0-18 | 55 | 14.6% |
| ■ 19-25 | 134 | 35.6% |
| ■ 26-40 | 160 | 42.6% |
| ■ 41-60 | 27 | 7.2% |
| <i>Category</i> | | |
| ■ General public | 315 | 83.8% |
| ■ Frontline medical workers | 8 | 2.1% |
| ■ Frontline non-medical workers | 16 | 4.3% |
| ■ Family members of frontline workers | 8 | 2.1% |
| ■ Others | 29 | 7.7% |
| <i>Education</i> | | |
| ■ High school senior and below | 65 | 17.3% |
| ■ Associate and bachelor's degrees | 271 | 72.1% |
| ■ Master's degree and above | 40 | 10.6% |
| <i>Physical condition</i> | | |
| ■ Healthy population | 332 | 88.3% |
| ■ Confirmed novel coronavirus cases | 10 | 2.7% |
| ■ Suspected novel coronavirus cases | 3 | 0.08% |
| ■ Contact with confirmed case | 15 | 4% |
| ■ Others | 16 | 4.3% |
| <i>Current place of residence</i> | | |
| ■ Wuhan city | 181 | 48.1% |
| ■ Non-Wuhan city, Hubei Province | 127 | 33.8% |
| ■ Other provinces in China | 65 | 17.3% |
| ■ Abroad | 3 | 0.08% |

es in the total score of PTSD and in the avoidance/emotional numbness dimensions between males and females. The Female scores were significantly higher than those of males ($t = -2.18, p < 0.05$). A one-way analysis of variance with age as the independent variable found that there were significant differences except for the re-experience dimension. For the avoidance/emotional numbness dimension, the scores of 19-25 year-olds were significantly higher than those under 18. For the high alertness dimension, the scores of 26-40 year-olds were significantly higher than those under 18. In general, the effect on people under 18 was less significant. For different education levels, post-comparative analysis found that there were significant differences in the

total scores of PTSD, re-experience, and the avoidance/emotional numbness dimension between high school seniors and below, and those with associate and bachelor's degrees. High school seniors and below were significantly more affected by the epidemic than those with greater academic qualifications. In the current place of residence, in terms of the re-experience factor and total PTSD score, residents of Wuhan had significantly higher scores than those from other regions in Hubei province, and other provinces in China. For the avoidance/emotional numbness and high alertness dimensions, residents in Wuhan had significantly higher scores than residents in other regions of Hubei province.

Table 2 One-way analysis of variance for different demographic characteristics of PTSD

| Characteristics | $\bar{x} \pm s$ | t / F 值 | p |
|---------------------------------------|-----------------|-----------|-------|
| <i>Gender</i> | | | |
| ■ Male | 42.3 ± 17.38 | -2.12* | 0.04 |
| ■ Female | 46.93 ± 17.19 | | |
| <i>Age-group</i> | | | |
| ■ 0-18 | 40.33 ± 18.68 | | |
| ■ 19-25 | 47.53 ± 17.19 | 2.93* | 0.03 |
| ■ 26-40 | 47.09 ± 16.99 | | |
| ■ 41-60 | 42.52 ± 14.93 | | |
| <i>Category</i> | | | |
| ■ General public | 46.18 ± 17.66 | | |
| ■ Frontline medical workers | 40.25 ± 12.35 | 0.97 | 0.43 |
| ■ Frontline non-medical workers | 39.75 ± 13.55 | | |
| ■ Family members of frontline workers | 51.63 ± 19.37 | | |
| ■ Others | 46.59 ± 15.65 | | |
| <i>Education</i> | | | |
| ■ High school senior and below | 51.49 ± 16.06 | | |
| ■ Associate and bachelor's degrees | 44.80 ± 17.50 | 4.13* | 0.02 |
| ■ Master's degree and above | 44.53 ± 16.64 | | |
| <i>Physical condition</i> | | | |
| ■ Healthy population | 46.15 ± 17.49 | | |
| ■ Confirmed novel coronavirus cases | 42.20 ± 14.42 | | |
| ■ Suspected novel coronavirus cases | 48.00 ± 18.52 | 0.21 | 0.93 |
| ■ Contact with confirmed case | 43.67 ± 17.82 | | |
| ■ Others | 45.50 ± 16.28 | | |
| <i>Current place of residence</i> | | | |
| ■ Wuhan city | 50.46 ± 16.94 | | |
| ■ Non-Wuhan city, Hubei Province | 40.65 ± 16.69 | 9.05*** | 0.000 |
| ■ Other provinces in China | 43.52 ± 16.37 | | |
| ■ Abroad | 48.00 ± 21.52 | | |

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

Table 3 Results of multiple linear regression on factors associated with PTSD

| Characteristics | B | $S.E$ | β | t | p |
|-----------------------------------|-------|-------|---------|-----------|-------|
| <i>Gender</i> | 5.25 | 2.12 | 0.12 | 2.467* | 0.014 |
| <i>Age</i> | 1.34 | 1.14 | 0.06 | 1.166 | 0.244 |
| <i>Education</i> | -4.74 | 1.72 | -0.14 | -2.743** | 0.006 |
| <i>Current place of residence</i> | -4.11 | 1.16 | -0.18 | -3.516*** | 0.000 |

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

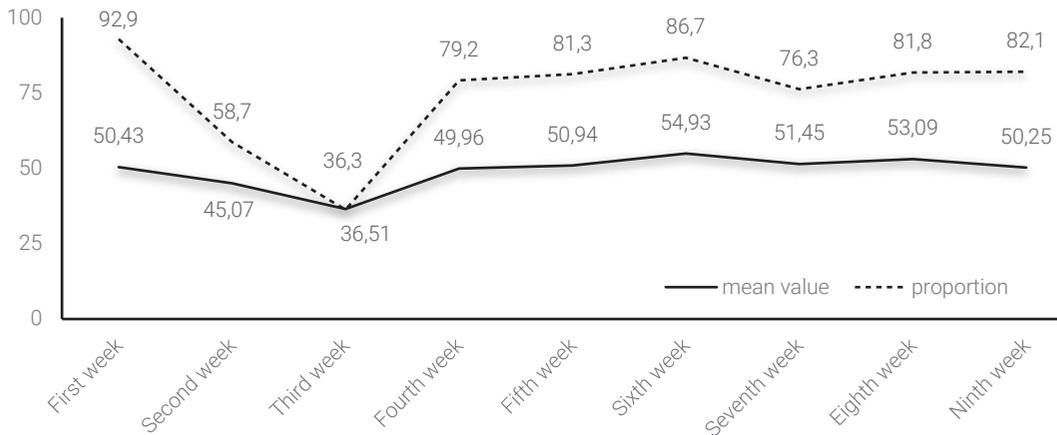


Figure 1 Timeline changes of PTSD

Multivariable linear regression analysis

Multivariable linear regression analysis using gender, age, educational level and current place of residence as independent variables and the total score of PTSD as the dependent variable was conducted to identify factors associated with PTSD. The results showed that gender, educational level, and current place of residence were the influential factors (Table 3).

PTSD timeline changes and comparison between “peak period” and “late epidemic period”

Based on data collected from March 1 to May 1, 2020, the average value and proportion of people with PTSD (with a total score on the scale greater than or equal to 38) were calculated on a weekly basis. The starting point was March 1 (Figure 1). During the first week, the proportion of people with PTSD symptoms was the highest, and in the third week, the proportion of people with PTSD symptoms was the lowest. It can be seen from Figure 1 that the level and proportion of people with symptoms gradually decreased from the first to the third week, and immediately following the third week, there was a rapid increase. This shows that even though the epidemic had stabilized, its impact on people’s mental health had not diminished.

The independent sample T-test was used to test the “peak period” and “late epidemic period.” It was found that the total score of PTSD was statistically significant

($p < 0.001$), and the level of PTSD in the “late epidemic period” was lower than that during the “peak period.”

Discussion

Influential factors of PTSD

This survey’s average PTSD score was 45.93 ± 17.32 , indicating that the epidemic is, to a certain extent, the cause of people’s PTSD. Out of 376 subjects, 239 people scored above 38 points, and the positive detection rate of PTSD was 63.56% among the participants, which was higher than the detection rate of all groups during SARS (Zhang et al.). This showed that the epidemic had a great impact on people’s degree of PTSD, which is noteworthy.

Gender. This study found that gender affects the degree of PTSD. The scores of female subjects were significantly higher than those of male subjects, which indicated that females were more vulnerable to COVID-19 than males. It showed that women may be more susceptible to being affected by major external disasters. During the SARS outbreak, studies found that the severity of women’s fear and anxiety was higher than that of men (Wang et al.,2003; Tang et al.,2006). Yang Ting (2020) also found that women were at higher risk for PTSD. All those investigations and studies showed that women’s psychological coping ability was lower than that of men in the face of major stress events. This may be relevant

Table 4 Comparison of the average score between “peak period” and “late epidemic period”

| | Peak Period | Late Epidemic Period | t |
|------------------|-------------------|----------------------|---------|
| Total PTSD Score | 51.58 ± 14.79 | 42.22 ± 17.87 | 5.52*** |

to the characteristics of women. For example, women are more sensitive to external events and more susceptible during emergencies and disasters [Ge et al., 2020].

Educational level. The results of variance analysis showed that there were significant differences among groups with various educational levels who developed PTSD. The lower the educational level, the higher the degree of PTSD. The degree of PTSD was higher in subjects with an educational level of high school senior and below than in subjects who had associate and bachelor degrees. Other studies also showed that with higher educational levels, the subjects' emotional scores showed a decreasing trend (Chen, Wang, Xie, & Chen, 2003). Subjects with higher educational levels had a wider range of knowledge than subjects with lower educational levels. They had a better understanding of the epidemic when facing the pressure brought by COVID-19 (Zhong et al., 2020), which helped them gain a sense of control more effectively. Moreover, they paid more attention to their mental health, and could use various available resources to help themselves, such as nonprofit consultations. Therefore, the degree of PTSD in this group was relatively lower. Results suggested that the available helping resources needed to be introduced to the public, especially to people with low academic qualifications.

Place of residence. The study found that another factor related to PTSD was the participant's current place of residence. The degree of PTSD of residents currently living in Wuhan was significantly higher than that of non-Wuhan residents in Hubei and other provinces. This regional difference was also reflected during the SARS outbreak in 2002. The closer to the epicenter, the more serious the danger and threat people felt, and the higher the possibility of PTSD. When SARS first appeared in Guangdong, the long distance between Beijing and Guangdong did not make people in Beijing feel too uneasy. But when SARS began to spread in Beijing, residents' negative emotions increased significantly (Qian et al., 2003). It showed that the physical distance away from the epicenter affected psychological distance, thus affecting psychological state. In addition, this might be related to the government's containment measures. The outbreak of COVID-19 happened during the Spring Festival, when a large number of people travel around the country, creating high risk for rapid transmission of the virus. In order to prevent further spread, to effectively protect more people by reducing the flow of travelers, and to calm people in other provinces, China made the unusual and difficult decision to place Wuhan on lockdown.

Change in the degree of PTSD over time

Analysis of the data showed that the proportion of people with PTSD symptoms was highest during the first week, because at the beginning of March, the epidemic was in a severe stage and prevention and control measures were relatively strict. During this peak period of the epidemic, people were in a state of worry and fear.

The average and proportion of cases of PTSD were lowest in the third week. Some researchers call this the "honeymoon period" of the disaster (Wang, 2001). There were more external resources at this time, such as condolences from the government, and institutions that may have brought temporary optimism and the belief that the disaster could be overcome, and life would soon return to normal. During the second week, General Secretary Xi came to Wuhan, and the Wuhan mobile hospitals were closed, indicating that the epidemic situation had been effectively controlled. Consequently, the PTSD score was reduced to its lowest during the third week. However, with the passage of time, the proportion of cases increased and fluctuated, and the mental health level returned to its previous state or climbed even higher. The population began to realize that assistance was limited, and under various pressures, with continued stress and fatigue, various problems became increasingly prominent.

At the beginning of the epidemic, people's main psychological problems were depression and anxiety. As the epidemic was gradually contained, the number of people who complained about depression, anxiety, and fear gradually decreased (Li et al., 2020), but the proportion of people with PTSD showed no trend of decreasing. This result was consistent with a PTSD follow-up study during the SARS period (Sun et al., 2005). According to the results of the analysis, although the epidemic is presently basically contained in China, the degree of PTSD and the number of people affected have not decreased, but have even increased with fluctuation. In addition, it was found that the mean value of PTSD in the late epidemic period was (42.22 ± 17.87), which showed that even during the later stage, people still have certain PTSD symptoms. Therefore, keeping an eye on PTSD during the late epidemic period would be the focus of psychological work for the next step.

At present, due to China's strong measures, the epidemic has been effectively contained, and anxiety and depression in the public sector might have been relieved. Nonetheless, according to the results of this study, it can be seen that people who experienced the epidemic are greatly affected. The study reveals that gender, educational level, and the current place of residence were influential factors on the degree of PTSD experienced, indicating that the need for psychological intervention for women, people with relatively low educational levels, and Wuhan residents might be urgent. We need to pay more attention to such groups and provide corresponding psychological help.

Relevant research (Li et al., 2020; Huang et al., 2020) studied the degree of PTSD and its influential factors on medical workers. However, this research sampled a relatively small number of medical workers. Therefore, it is more appropriate to use the general public to generalize this paper's conclusions. Generalization using frontline workers or other special populations should be used cautiously. Additionally, through the analysis

of psychological aid platform data, PTSD in the general population and its influential factors can be largely understood, and changes in the psychological symptoms of the masses can be examined longitudinally. However,

collecting data only in this form has limitations. In order to understand the changes in the degree of PTSD in the general population with more detail and accuracy, supplemental survey data and methods are needed.



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