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Short communication

Investigation of the mental health status of frontier-line and non-frontier-line medical staff during a stress period

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ABSTRACT

The Coronavirus Disease 2019 (COVID-19) epidemic has become a global public health event. Medical staff around the world are nervously responding to the crisis, and their mental health problems deserve attention. To better know the differences in the mental health status between frontier-line and non-frontier-line medical staff. This study used the Child PTSD Symptom Scale, the Self-Rating Depression Scale, the Self-Rating Anxiety Scale and the Connor-Davidson Resilience Scale to examine the PTSD, depression, anxiety and resilience among 162 frontier-line medical workers and 163 non-frontier-line medical workers in China. The results showed that all negative factor scores of non-frontier-line medical staff seemed to be worse than those of frontier-line medical staff, and the positive factor scores were the opposite through descriptive analysis, independent sample t-test and Chi-square test. Some psychological effects and theories were used to explain this phenomenon. Intervention suggestions for medical staff and future research directions were discussed.

1. Introduction

The Coronavirus Disease 2019 (COVID-19) epidemic emerged in late 2019 and now is spreading worldwide, being the largest outbreak of atypical pneumonia since the outbreak of severe acute respiratory syndrome (SARS) in 2003 (Qiu et al., 2020). Medical staff around the world are nervously responding to the crisis (People's Daily, 2020).

In early 2020, the outbreak in Wuhan, China, became very serious, the growing number of patients put tremendous pressure on the local medical system and medical staff in Wuhan; thus, medical workers in Wuhan have been facing many challenges (Kang et al., 2020). At the time when local medical supplies and staff were in short supply, medical workers from other provinces of China rushed to Wuhan for assistance beginning on January 23, 2020 (Beijing News, 2020). As of April, a total of 42,000 medical staff from all over China have assisted Wuhan, of which Jiangsu contributed the earliest support and the largest number of medical staff (Xinhua News Agency, 2020). Furthermore, in addition to the frontier-line medical staff who went to Wuhan for assistance, the non-frontier-line medical staff who stayed in Jiangsu stuck to their posts were also concerned about the development and spread of the epidemic. However, literatures concerned about the mental health status of

medical staff almost focused on the mental health of frontier-line medical staff, while few paid attention to the mental health of non-frontier-line medical staff. Therefore, this study conducted to explore the differences of the mental health status between frontier-line and non-frontier-line medical staff.

Previous studies have found that in high-risk and stressful epidemic environments, medical staff are prone to have a range of psychological problems, such as depression, anxiety and PTSD (Kang et al., 2015; Duan and Zhu, 2020). Anxiety is a kind of psychological stress accompanied by a series of physiological events and it could cause a decrease in immunity (Liu, Chen, et al., 2020). Anxiety and depression can co-occur in an individual (Zhong et al., 2020). Depression is more likely to be associated with a lack of emotion, low motivation, reduced levels of mental activity, and negative self-assessment (Joiner et al., 1996). PTSD is a delayed, long-term psychosocial syndrome that occurs after a person has suffered an overwhelming traumatic event (Khazaie et al., 2016). A mental health status survey of 246 front-line medical staff found that the incidence of anxiety and PTSD in medical staff was 23.04% and 27.39% (Huang et al., 2020). Another survey consisted 79 doctors and 86 nurses also found that the prevalence rates of anxiety and depression symptoms among doctors was 11.4% and 45.6% respectively

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Table 1
Demographic variables between frontier-line and non-frontier-line medical staff.

Variable	M (SD) or N (%)		
	Total sample	first-line medical staff	general medical staff
Age	30.87 (6.43)	31.22 (5.73)	30.52 (7.07)
Daily working time (hours)	7.40 (3.06)	6.54 (3.82)	8.26 (1.67)
Gender			
Male	41 (12.6%)	34 (21.0%)	7 (4.3%)
Female	284 (87.4%)	128 (79.0%)	156 (95.7%)
Education background			
College degree or below	54 (16.6%)	24 (14.8%)	30 (18.4%)
Bachelor	241 (74.2%)	118 (72.8%)	123 (75.5%)
Master or above	30 (9.2%)	20 (12.3%)	10 (6.1%)
Marital Status			
Single	139 (42.8%)	69 (42.6%)	70 (42.9%)
Married	178 (54.8%)	86 (53.1%)	92 (56.4%)
Divorced/ Separated	6 (1.8%)	5 (3.1%)	1 (0.6%)
No answer	2 (0.6%)	2 (1.2%)	0
Mental disease experience			
Yes	39 (12.0%)	13 (8.0%)	26 (16.0%)
No	286 (88.0%)	149 (92.0%)	137 (84.0%)
Sleep quality			
Poor	27 (8.3%)	13 (8.0%)	14 (8.6%)
Medium	182 (56.0%)	89 (54.9%)	93 (57.1%)
Good	116 (35.7%)	60 (37.0%)	56 (34.4%)
Taking sleeping pills			
Yes	23 (7.1%)	11 (6.8%)	12 (7.4%)
No	23 (7.1%)	151 (93.2%)	151 (92.6%)
Daily sleep time (hours)	6.90 (1.22)	6.93 (1.21)	6.86 (1.23)

and among nurses was 27.9% and 43.0% respectively (Zhu et al., 2020). Therefore, the mental health of medical personnel will become a topic worthy of all attention.

Although, traumatic events like COVID-19 may bring negative consequences to individuals, adversity can also motivate persons to show his or her resources to overcome the difficulties, and this protective ability called resilience. Resilience refers to a set of individual's traits, which can promote their successful adaption and positive force from adversity and crisis (Kalisch et al., 2017; Yuan et al., 2018). Hence, the study aimed to explore these positive and negative outcomes between frontier-line and non-frontier-line medical staff.

2. Method

2.1. Participants

This study conducted from February 10 to February 28, 2020. A total of 325 participants were enrolled in the study, of whom 162 were frontier-line medical workers and 163 were non-frontier-line medical workers and all of them were originally employed in the same hospital in Jiangsu Province. Among frontier-line medical staff, 21% are males and 79% are females, and for non-frontier-line medical staff, 4.3% are males and 95.7% are females. More demographic data see Table 1. All participants completed the questionnaire online.

2.2. Measure

Posttraumatic stress disorder symptom levels were measured by the Child PTSD Symptom Scale (CPSS; Foa et al., 2001). The Chinese version of CPSS was revised by Zhou et al. (2016). This is a 20-item self-report

scale. Participants need to report the presence and frequency of their symptoms during the previous 2 weeks. The scale includes 4 subscales, intrusions, avoidance, negative cognition and emotion alteration, hyper-arousal. According to the PTSD diagnostic criteria of DSM-5 (American Psychiatric Association, 2013), the following conditions were prevalence criteria for its dimension of invasion, avoidance, emotion alteration and hyper-arousal: at least one item's score of the invasion and avoidance subscale is equal to or more than 2; at least two items' score of the emotion alteration and hyper-arousal subscale is equal to or more than 2. Individuals who met all the above conditions were identified as having "high risk of suffering from PTSD." In the current study, Cronbach's α coefficient of this scale was 0.95.

Depression was assessed by using the 20-item Self-Rating Depression Scale (Zung et al., 1965). The original score was multiplied by 1.25 and the integral part was the standard score. The higher the standard score, the more obvious the symptoms were. According to the results of the Chinese norm, the SDS standard score is 53 points, among which 53–62 points are considered as mild depression, 63–72 points are considered as moderate depression, and 73 points or above are considered as major depression. In the current study, Cronbach's α coefficient of this scale was 0.88.

Anxiety was assessed by using the 20-item Self-Rating Anxiety Scale (Zung, 1971). The original score multiplying by 1.25 after taking the integer part was counted as the standard score; the higher the standard score, the more obvious the symptoms were. According to the results of the Chinese norm, the SAS standard score is 50 points, among which 50–59 points are considered as mild depression, 60–69 points are considered as moderate depression, and 69 points or above are considered as major depression. In the current study, Cronbach's α coefficient of this scale was 0.86.

Sleep quality was measured by asking medical staff "how has your sleep quality been since you participated in epidemic-related work?" There are three answers to the question, with 1 being poor, 2 being average and 3 being good.

Resilience was assessed using the Chinese version (Yu and Zhang, 2007) of the CD-RISC (Connor and Davidson, 2003). The scale consists of 25 items and includes 3 subscales: strength, optimism, and tenacity. Higher scores indicate higher levels of trait resilience. Cronbach's α of this scale in the present study was 0.97.

2.3. Data analysis

The data was analyzed using SPSS 21.0. We did the descriptive statistics, analysis of variance, independent sample T test and Chi-square test. Harman's single factor test was used to examine common method bias (Podsakoff et al., 2003). The results showed that the variance explained by the first factor after not rotation and rotation respectively was 34.16% and 18.16%, which were both less than the critical value of 40%. Therefore, no signs for significant common method bias were detected in the current study.

3. Results

The result of descriptive statistics shows that the detection rates of PTSD were 9.9% in the frontier-line medical staff and 11.7% in the non-frontier-line medical staff. In addition, 9.9% of the frontier-line medical staff and 19.6% of the non-frontier-line had mild depression, 4.3% of the frontier-line medical staff and 4.3% of the non-frontier-line had moderate depression, and 0.6% of the frontier-line medical staff and 2.5% of the non-frontier-line had severe depression. In addition, 7.4% of the frontier-line medical staff and 11.0% of the non-frontier-line had mild anxiety, 0.6% of the frontier-line medical staff and 1.8% of the non-frontier-line had moderate anxiety, and 0.6% of the frontier-line medical staff and 1.8% of the non-frontier-line medical staff had severe anxiety. Sleep quality of frontier-line medical staff was 2.29 and of non-frontier-line medical staff was 2.26, which means their sleep quality was

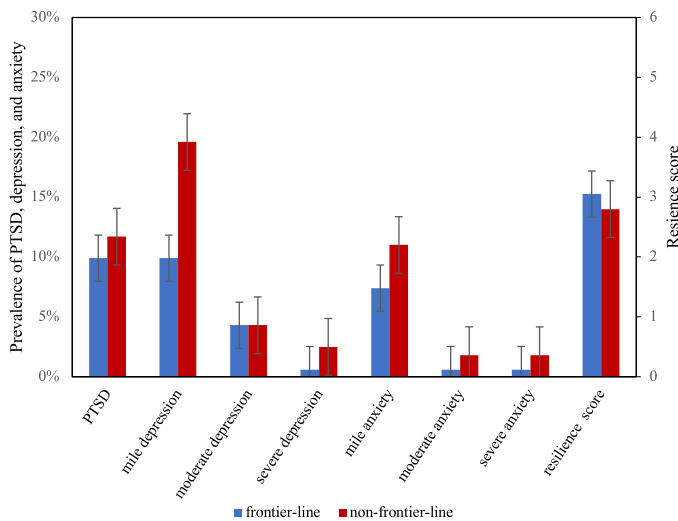


Fig. 1. Comparison of prevalence of PTSD, depression, anxiety and scores on resistance among frontier-line and non-frontier-line medical staff.

both general and there was no significant difference. As shown in Fig. 1, all negative factor scores of non-frontier-line medical staff seemed to be worse than those of frontier-line medical staff, and the positive factor scores were the opposite.

According to Table 2, except of intrusions of PTSD and sleep quality, all differences of variables between frontier-line and non-frontier-line medical staff are significant. Other detailed information of mental health status factors between frontier-line and non-frontier-line medical staff are shown in Table 2.

4. Discussion

This study examined the differences of the mental health status between frontier-line and non-frontier-line medical staff. The results may be different from people’s expectations: why does the mental health status of the medical staff fighting on the front line of the epidemic area look better than that of the medical staff who did not face a large number of infected patients directly?

Some psychological effects and theories can explain this phenomenon. First, the “Psychological Typhoon Eye” effect (Li et al., 2009) refers to the phenomenon by which individuals’ psychological responses are milder in the central area where disasters occur than in areas outside the center because repeated exposure to a catastrophic environment can

increase the individual’s level of resilience, thereby improving their ability to resist adverse life events (Tang et al., 2019). Indeed, from the results, the level of resilience of frontier-line medical staff was higher than that of non-frontier-line staff, which may be the reason for the better level of mental health of the frontier-line medical staff. To help encourage the “Psychological Typhoon Eye”, mental health-related factors were taken into account in the selection of frontier-line medical staff.

Moreover, Stress-Appraisal Theory (Richard, 1999) means the health risks perceived by people do not depend on the risk itself but on their psychological factors, such as whether they are susceptible to infection or whether the individual is capable of coping with the disease. Although medical staff in the epidemic area are highly vulnerable to the virus, some researchers have found that the collectivist culture can improve people’s perceived protection efficacy (Kim, et al, 2016), which makes people have a higher sense of security and stability, and thus can have a positive effect on people’s mental health. The reason why collectivism has such a protective effect is that people in collectivism cultures have a stronger sense of belonging and social connection, which can make people feel they are supported in the face of epidemic disasters and improve people’s resilience and mental health (Atsuki et al, 2018).

In addition, the depression of frontier-line nurses usually stems from sympathy for COVID-19 patients, whereas non-frontier-line medical staff feel sympathy not only for COVID-19 patients but also for frontier-line colleagues (Li et al, 2020). The current situation is that psychological workers attach great importance to the mental health of front-line medical staff; thus, frontier-line workers can receive more effective and timely psychological intervention, which plays a vital role in maintaining their mental health status (Chen et al., 2020).

5. Limitations

First of all, this study only examined the mental status of medical staff in one hospital in Jiangsu province. In the future, the scope of the subjects could be expanded to explore the differences of the mental health status between the two kinds of medical staff in other provinces, so as to verify whether the “psychological typhoon eye” effect exists in areas with different degrees of impact from the epidemic. Then, the PTSD scale used in this study is for children and adolescents, and that may cause some bias. In addition, a study after the SARS outbreak in 2003 showed a significant amount of long-term stress in healthcare workers (Maunder et al., 2008). Therefore, future research should track the mental health status of front-line medical staff and develop longitudinal research. Finally, cross-cultural research could be implemented to explore whether this phenomenon exists in countries with individualistic cultures.

Table 2
Characteristics of mental health status factors between frontier-line and non- frontier-line medical staff.

Characteristics	Total sample		frontier-line medical staff		non- frontier-line medical staff		t/χ ²	p	95%CI	effect size
	M(SD)	N	M(SD)	N	M(SD)	N				
PTSD	14.21(13.63)	322	12.23(12.67)	159	16.15(14.28)	163	-2.604*	0.010	(-6.88, -0.96)	0.29
PTSD-I	4.23(4.07)	322	3.86(4.00)	159	4.6(4.12)	163	-1.634	0.103	(-1.63, 0.15)	0.18
PTSD-A	1.23(1.61)	322	1.03(1.52)	159	1.42(1.68)	163	-2.229*	0.026	(-0.75, -0.05)	0.24
PTSD-N	4.09(4.68)	322	3.25(4.10)	159	4.91(5.06)	163	-3.234**	0.001	(-2.67, -.065)	0.36
PTSD-H	4.66(4.62)	322	4.09(4.19)	159	5.21(4.95)	163	-2.190*	0.029	(-2.13, -0.11)	0.24
Depression	33.99(9.26)	323	32.22(8.37)	161	35.75(9.78)	162	-3.484**	0.001	(-5.52, -1.54)	0.39
Anxiety	30.45(7.53)	321	29.51(7.03)	160	31.39(7.90)	161	-2.250*	0.025	(-3.52, -0.24)	0.25
Sleep quality	2.27(0.61)	325	2.29(0.61)	162	2.26(0.60)	163	0.260	0.878		0.05
Resilience	2.92(0.65)	323	3.05(0.59)	161	2.8(0.68)	162	3.436**	0.001	(0.10, 0.38)	0.39
Resilience-S	3.11(0.67)	323	3.27(0.61)	161	2.94(0.69)	162	4.531***	0.000	(0.18, 0.47)	0.51
Resilience-O	2.93(0.70)	323	3.01(0.64)	161	2.85(0.74)	162	2.039*	0.042	(0.01, 0.31)	0.23
Resilience-T	2.81(0.68)	323	2.92(0.64)	161	2.7(0.70)	162	2.936**	0.004	(0.07, 0.37)	0.33

* p < 0.05,
** p < 0.01,
***p<0.001

PTSD-I, Intrusions; PTSD-A, Avoidance; PTSD-N, Negative Cognition and Emotion Alteration; PTSD-H, Hyper-Arousal; Resilience-S, Strength; Resilience-O, Optimism; Resilience-T, Tenacity.

6. Conclusion

The research examined the differences of the mental health status between frontier-line and non-frontier-line medical staff. The prevalence of PTSD, depression and anxiety of frontier-line medical staff was higher than non-frontier-line medical staff. In contrast, the level of resilience in frontier-line medical staff was higher than non-frontier-line medical staff. This result suggests that during the outbreak of an epidemic, we should pay attention not only to the mental health of frontier-line medical staff but also to that of the non-frontier-line staff.

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CRediT authorship contribution statement

Yuanyuan An: Writing - original draft. **Yijing Sun:** Methodology, Writing - review & editing. **Zhengkui Liu:** Conceptualization, Investigation, Supervision. **Yaru Chen:** Writing - review & editing.

Declaration of Competing Interests

There are no conflicts of interest.

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