The physical and mental health for the medical staff caring for patients with COVID-19 in Wuhan Huoshenshan Hospital: A structural equation modeling

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Research

Keywords: COVID-19, Wuhan Huoshenshan Hospital, medical staff, Fatigue, Anxiety, Resilience, SEM

Posted Date: August 18th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-58110/v1

Abstract

Background: Early in the epidemic of corona virus disease 2019 (COVID-19), Chinese government had recruited a portion of military healthcare workers to support the designated hospital (Wuhan Huoshenshan Hospital) to relieve the front-line workload in Wuhan, China. It was reported that the majority of the front-line medical staff (FLMS) suffered from adverse effects, but their physical and psychological health status and its relationship were still unknown. Hence, a structural equation modeling (SEM) was conducted to establish and test the latent relationship among variables.

Methods: This is a cross-sectional study. Totally 115 convenience samples of military medical staff from Xinqiao Hospital in Chongqing were enrolled during February 17th to February 29th, 2020. The medical staff assisting in Huoshenshan Hospital were selected as experimental group(n=55), the other medical staff were control group(n=60). Self-reported sleep status, fatigue status, resilience status and anxiety status were examined.

Results: During COVID-19, the medical staff underwent some impairments of physical and psychological health. The anxiety score of experimental group was (42.84±9.44), the fatigue score was (52.85±9.33), and the resilience score was (67.58±11.75). And the score of anxiety, fatigue, resilience of control group were (46.27±9.94), (49.33±11.20), (65.42±14.54) respectively. For experimental group, we found the different working duration and different attitude to work in Wuhan both had significant differences in fatigue scores (P<0.05); As for resilience scores and anxiety scores, only different current perceived health status of participants showed a statistically significant difference (P<0.05). The SEM results indicated the direct path from resilience to fatigue (β=-0.129, P=0.032) and anxiety (β=-0.026, P=0.043) were both significant, it revealed that resilience were negatively associated with the level of fatigue and anxiety, and the indirect path showed fatigue had a significant mediating effect between resilience and anxiety (β=-0.146, P=0.039) of the Huoshenshan Hospital medical staff.

Conclusion: During an explosive pandemic, motivating the effect of individual's internal resilience and making use of proper external interventions is a promising way to protect the physical and mental health of the front-line medical staff.

Background

In December 2019, the outbreak of an infectious pneumonia with one seafood whole sale market exposure history happened in Wuhan (Hubei, China), it was confirmed that they were infected with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the disease was officially named as Corona Virus Disease 2019 (COVID-19) by the World Health Organization (WHO) [1–3]. The transmission of COVID-19 mainly through respiratory droplets and close contact and the incubation period ranges from 2 to 14d [4], its strong contagion brought about a rapidly rising number of confirmed and suspected cases during the Chinese Lunar New Year holiday in China, and it spread all over the world reaching a pandemic level by the end of March. Until March 16th ,2020, the new confirmed patients with COVID-19 in China was only 29, and the global confirmed patients was up to 167,515 [5], it meant the spread of the Chinese epidemic was in control. However, the global pandemic deserving urgent attention is still continuing .

Early in the epidemic, more than 30,000 healthcare workers nationwide were assigned to Wuhan to assist in the treatment of patients in the local hospitals [6]. Then the Chinese government temporarily built two designated hospitals used to treat COVID-19 patients in Wuhan to release the capacity stress of the local hospitals, one of which was named Wuhan Huoshenshan Hospital. In the face of limited medical resources, heavy workload, a lack of specific drugs, risk of infection, and the separation from family and friends for a long time, FLMS underwent huge pressure, and mental problems such as stress, anxiety, depressive symptoms, insomnia, anger and fear were always detected [7]. These mentioned problems not only affected their work efficiency, but there would be a lasting effect on their overall well-being [8]. Therefore, the investigation for real health status of FLMS is of great importance.

- The epidemic of COVID-19 has become a major public health events which arouse many stress responses not only on the common people but also on the medical staff, how to recognize and cope with the physical and mental health problems are the key points to protect them from short-time and long-time injures. According to the crisis intervention theory [9], the FLMS could stimulate their inherent resources such as cognitive regulation and positive coping style at first to keep the balance between themselves and the environmental crisis. Similar to the severe acute respiratory syndrome (SARS) epidemic, once the medical staff cannot bear the stress intensity in clinical work, mental and physical sub-health was likely to happen, including headache, dizziness, anxiety, depression, compulsion and so on [10, 11]. At this time, the combination of internal and external interventions is necessary, which could be beneficial to the recovery or rehabilitation of the medical staff from adverse conditions. Eventually, the physical and mental health of the FLMS would return to, below even above their original level with the help of crisis intervention [12].
- Resilience is an ability of individuals to bounce back or to cope successfully despite adverse circumstances and crises, it has been regarded as a personality trait which plays a regulating role in a dynamic process [13–16]. However, it is still unknown what influence the resilience's effect would have on the physical and mental health of the medical staff working in Wuhan Huoshenshan Hospital, and the latent relationship between the variables demonstrating their physical and mental health is not clear. Hence, we aim to investigate the resilience, self-reported

sleep status, fatigue and anxiety status of the medical staff from one medical institution (some of them are temporarily working in Wuhan Huoshenshan Hospital) and determine the mutual effects between these variables by SEM.

Methods And Material

Study participants

A cross-sectional clinical study was adopted to collect the anxiety, sleep status, resilience, fatigue and other demographic data from the participants. Our study enrolled 115 military medical staff from February 17th to February 29th in 2020 by convenience sampling method. All the participants came from Xinqiao Hospital, a military medical hospital in Chongqing, China. 55 FLMS temporarily treating the patients with COVID-19 in Wuhan Huoshenshan Hospital were selected as experimental group and 60 medical staff working in an intensive care unit were selected as control group.

Data collection and measuring instruments

Demographic and social data

Demographic data of our participants included age, gender, profession, marital status, profession, technical title, department, years of work experience, current perceived stress level, current perceived health status, attitude to work in Wuhan, and so on.

The Self-Rating Anxiety Scale (SAS)

The SAS is a self-reported scale made up of 20 items to estimate the subjective anxiety and its changes of individuals, and it covers a variety of anxiety symptoms. Each question was scored 1-4 points. An aggregate score of the 20 items then multiply by 1.25, the integer part is the standard score. The higher the standard scores, the more severe levels of anxiety [17,18]. According to the results of Chinese general population, the SAS total scores of 50 points is normal, 50-59 points is mild anxiety, 60-69 points is moderate anxiety, and more than 69 points is severe anxiety [19].

The Self-Rating Scale of Sleep (SRSS)

The SRSS is a self-reported questionnaire which was tailored for the Chinese population by Chinese psychologists Li [20]. This scale includes 10 items, each statement has five graded answers, respectively scored as 1 to 5, total scores can range from 10 to 50. The aggregate scores of SRSS are classified into normal (scores<23), mild sleep disturbance (scores between 23 and 29), moderate sleep disturbance (scores between 30 and 39), and severe sleep disturbance (scores>39). The reliability (Cronbach'α=0.6418, $P<0.001$) and validity ($r=0.5625$, $P<0.001$) of SRSS have been established.

The Multidimensional Fatigue Inventory (MFI-20)

The MFI-20 is a 20-item self-reported measurement of fatigue. It includes five dimensions: General Fatigue (GF), Physical Fatigue (PF), Mental Fatigue (MF), Reduced Motivation (RM) and Reduced Activity (RA). Every item is rated on a 5-point Likert scale, every subscale's single total scores are summed up ranging from 4 to 20 scores. Higher total scores indicates higher levels of fatigue. Validity and internal consistency have been verified to be good for different participants [21].

The Connor-Davidson Resilience Scale (CD-RISC)

The CD-RISC is a self-report questionnaire that comprises of 25 items, each rated on a 5-point Likert scale(ranging from 0= "not at all true", to 4= "true nearly all of the time"), with higher scores reflecting greater resilience. Psychometric evaluation of the CD-RISC conducted on clinical and general population samples found the scale had good reliability (Cronbach'α=0.89), validity, psychometric properties, good internal consistency and test-retest reliability ($r=0.87$) [22]. Exploratory factor analysis with the Chinese samples resulted in a 3-factor structure of CD-RISC, labeled respectively as Tenacity, Strength and Optimism [23].

Study procedures

Data collection of our study was completed by a Questionnaire Star platform, named Wenjuanxing (http://www.wjx.cn) relying on QR codes in Wechat with anonymity. Two investigators working in Wuhan Huoshenshan Hospital and Xinqiao Hospital respectively explained the research purpose and method to participants, issued the QR code after obtaining consents and collected their relevant data retrospectively. Only volunteers who did not refuse it were enrolled in and they could quit the process at any time. However, we did not get ethic approval because the Huoshenshan Hospital was a temporary hospital with no Clinical Research Ethics Committee.

Hypotheses of SEM

We have set variables bundle based on the literature review, include 4 latent variables and its observed variables of the FLMS working in Wuhan Huoshenshan Hospital: the resilience status, the fatigue status, the physical burden status, the anxiety status. According to the crisis intervention

theory, our hypotheses were as follows: ①The resilience had a statistically significant direct negative effect on the anxiety status, physical burden and fatigue status. ②The fatigue status had a statistically significant direct positive effect on the physical burden and anxiety status.③The physical burden had a statistically significant direct positive effect on the anxiety status. ④The fatigue status had a statistically significant indirect positive effect on the anxiety via the physical burden. ⑤The resilience had a statistically significant indirect negative effect on the anxiety via fatigue status, see Fig.1.

Statistical analysis

After checking the date accuracy, IBM SPSS Statistics (Version 22.0) and AMOS (Version 23.0) were applied to complete the data analysis. Descriptive analysis was used to describe the general data, frequencies and percentages were used for count data, and (mean±standard deviation) was used for measurement data. Comparison of difference between groups conducted by independent-sample t-test and analysis of variance (ANOVA). The Maximum Likelihood Estimation was employed for parameter estimation. In SEM, the model fit index of path analysis usually includes the goodness-of-fit index (GFI), the adjusted goodness-of fit-index (AGFI) and so on. In this study, we assumed that the root mean square error of approximation (RMSEA) <0.08, the comparative fit index (CFI) and the normal fit index (NFI)>0.9, the parsimany-adjusted normal fit index (PNFI) and the parsimany-adjusted comparative fit index (PCFI)>0.5 resulted in an acceptable model, when *P* values<0.05, the difference is considered as statistically significant [24].

Results

Demographic and social characteristics

Finally, totally 115 medical staff completed the study questionnaires. The mean age of experimental group was (32.89±5.8) years, including 9 doctors and 46 nurses. And the mean age of control group was (32.58±6.47) years, including 15 doctors and 45 nurses, as shown in Table 1. All the participants were basically in good physical condition and had no chronic diseases.

Comparison of the SAS, MFI-20 and CD-RISC between the experimental group and control group

Our results showed that the total anxiety scores of the FLMS in Huoshenshan Hospital was lower than that of the control group, and the total fatigue and resilience scores were higher than the control group, nevertheless, there were no statistical differences (P>0.05). Only a few dimensions of the fatigue and resilience manifested that there were significant differences (P<0.05), as shown in Table 2.

Comparison of the SAS, MFI-20 and CD-RISC among different demographic characteristics in the experimental group

As observed in Table 3, the different working duration in Wuhan and different attitude to work in Wuhan both had significant differences in fatigue scores during the investigation (P<0.05); As for resilience scores and anxiety scores, only different current perceived health status of participants showed a statistically significant difference (P<0.05).

The SEM constructing process for the medical staff working in Wuhan Huoshenshan Hospital

In our research, we assumed resilience and anxiety as variables to assess a part of the mental health of the medical staff working in Huoshenshan Hospital, and assumed physical burden and fatigue to assess the partial physical health of them. Firstly, the latent variable resilience was estimated by tenacity, strength and optimism dimensions. Secondly, the work duration in Wuhan, the self-rating sleep status, the perceived health status and working intensity of the medical staff were regarded as observed variables of the latent variable physical burden. Thirdly, the latent variable fatigue was consisted of GF, PF, MF, RM and RA scores. The fourth area was anxiety estimated by the subjective feelings including the perceived stress level, confidence in overcoming the epidemic and self-reported anxiety scores of the medical staff. Finally, we established a SEM of the association between the four latent variables and their observed variables, and the chi-square value of the model result was 104.736 with degrees of freedom=81 and the P-value=0.039. The model fit results yielded values of RMSEA=0.074, CMIN/DE=1.293, GFI=0.807, AGFI=0.714, NFI=0.752, IFI=0.93, TLI=0.903, CFI=0.925, PNFI=0.580, PCFI-0.714, which showed the model had an acceptable fit to the data.

The results indicated the direct path from the scores for resilience to the scores for fatigue (β=-0.129, P=0.032) and the scores for anxiety (β=-0.026, P=0.043) were both significant. A bootstrap sample of 1000 tested the mediating effect of the study variables. We found that in the two tested indirect path, only the scores for fatigue had a significant mediating effect between the scores for resilience and the scores for anxiety (β=-0.146, P=0.039) of the medical staff working in Wuhan Huoshenshan Hospital while the confidence interval did not include 0. All of the structural paths for the model were presented in Figure 2 and Table 4.

Discussion

To our knowledge, this research is the first study focusing on exploring the underlying relationship among variables which represent physical health and mental health of the FLMS who closely contact with infected COVID-19 patients.

We measured the anxiety level of the medical staff under the impact of COVID-19 epidemic, the results demonstrated that there was no substantial difference between experimental group and control group. However, it was not consistent with the anxiety scores of other two medical staff groups (direct contact treatment vs non-direct contact treatment) [25], and the anxiety scores of our two group were both lower than the medical staff from Heilongjiang province in China as compared with the studies conducted by Liu [26] and Zhou [27] respectively, this may be because all of our participants were military medical staff with relatively better psychological endurance and adjustment ability. Meanwhile, our experimental group working in Wuhan Huoshenshan Hospital, which was located in the epicenter of the crisis, they had better organizational support and more trust in equipment/infection control initiatives, so the anxiety level was not very high and their tenacity was more easily stimulated than the control group (T=0.308, *P*=0.028). As for fatigue level, there were significant differences between the experimental group and the control group in terms of GF (T=2.666, *P*=0.002) and PF dimensions scores (T=0.810, *P*=0.005), it seemed that the ever-increasing number of confirmed and suspected cases, front-line overwhelming workload, uncomfortable and deficient medically protective materials (such as N95 masks, goggles and protective clothing), lack of specific drugs were likely to contribute to the difference of physical fatigue between these two groups [28,29].

In our study, we found that the variables of working duration in Wuhan (T=-4.82, *P*=0.047) and attitude to work in Wuhan (T=-2.0, *P*=0.026) had statistical differences when it comes to the fatigue level of the experimental group, and different current perceived health status showed different resilience (F=7.64, *P*=0.001) and anxiety level (F=3.87, *P*=0.027). The COVID-19 pandemic is unprecedented, the medical staff were exposed to both physical and psychological stress [30]. In a previous study, those healthcare workers who were involuntarily deployed to work with SARS patients tended to experience more adverse outcomes [31], which was similar to our results that different attitude of medical staff before they were dispatched to Wuhan caring for COVID-19 patients would affect their follow-up fatigue level, perhaps it depended on their physical and psychological readiness and self-adjustment capacity in the face of hardship. It was easy to understand that mandatory long work, shift work and night shifts could induce in prolonged fatigue due to impaired recovery from work for medial professionals [32,33], the longer working duration, the more fatigue and burnout the FLMS have. As WHO said, hazards including pathogen exposure, long working hours, fatigue, occupational burnout and so on put health workers at risk of infection [34], more healthy, safe and decent working conditions for them was urgently needed. A review regarding to population-based mental health during COVID-19 stated that poor perceived health was associated with higher rates of anxiety [35], when medical staff are in good health, they are rarely interfered by physical illness and pay more attention to their own psychological status. Therefore, less health anxiety would generate when they in face of overwhelming media reports and treatment reality shock [36], and the effect of resilience would be first mobilized to adjust the adverse impacts of negative psychology [37].

Finally, this study applied SEM to determine the relationship among variables concerning physical and mental health for the medical staff caring for patients with COVID-19 in Wuhan Huoshenshan Hospital. Nevertheless, the hypotheses of our study were not totally confirmed, resilience level of the experimental group were shown to have statistically significant effects on both fatigue level and anxiety level, and their resilience level was verified to affect the anxiety level towards the fatigue level. Resilience is a multidimensional concept which has shown increasing importance recently in coping strategies in response to hardship [38], Windle [39] and Liu et al. [40] have provided current definitions that took this construct for a process through which individuals use personal and environmental elements in order to redirect traumatic adverse and stressor of everyday life. Given several studies have confirmed the existence of a negative relationship between resilience and anxiety like our study result [41,42], the higher level of resilience, the lower anxiety the medical staff would feel (β=-0.026, *P*=0.043), we could determine the resilience as a protective factor when the FLMS were confronted with the unknown and severe pandemic. The inherent implication contained in resilience explains how events are perceived and how much strength of behaviour is addressed by individuals, meanwhile, the emotional adaptation and regulation to problematic situations are highlighted through this process [43]. Furthermore, many studies have shown that higher levels of resilience not only link to improved mental health but also maintain physical health in the general population or other chronically ill populations [44,45]. In our findings, the negative relationship was verified between the levels of resilience and fatigue (β=-0.129, *P*=0.032), as Jeon [46] and Ristevska-Dimitrovska [47] claimed, resilience is a powerful predictor of fatigue, someone who is less resilient always has worse body image and physical function, their pessimism might hinder a more optimistic outlook of life to make a difference in such a grim reality. Fatigue was a reflection of how medical staff deal with crisis strikes, including seeking social support, avoidance, problem solving and so on, high-intensity workload aggravated the fatigue of the FLMS, prolonged fatigue would make their physical function decline and even work efficiency do. Moreover, some of them who were in sub-health states maybe more susceptible to virus, which induced in the increasing of their anxiety level relating to uncertainty feeling and contagion fear [48,49]. In general, the fatigue of the experimental group could be mitigated by individual's resilience, it was supposed to be a positive process which indirectly affected their anxiety level via regulating the fatigue level.

Limitations

However, there are some limitations in our research. Firstly, the sample size of the FLMS working in Wuhan Huoshenshan Hospital is not very large because of the heavy workload, so the accuracy of the parameter estimation cannot be guaranteed. And it is still not known whether some significant relationships have not been discovered yet, it is of great need to enroll more samples for further retrospective research. Secondly, the cross-sectional study design could not reflect the dynamic health status of the observed participants, exploring the physical and psychological health change of the medical staff especially those who closely contact with the COVID-19 infected patients everyday is necessary.

Conclusion

Thanks for the timely policies and procedures published by Chinese government, the solidarity and cooperation of all sectors of society, we ultimately saw the abatement of the COVID-19 epidemic in China. In this arduous pandemic, the medical staff is one of the indispensable forces to resist crisis, their wellbeing deserve more attention. Currently, global pandemic is still developing, evidence-based physical and mental health interventions targeting the front-line health care workers are scarce, our results revealed that stimulating the effect of individual's resilience may be one of the promising strategies to alleviate the physical and mental burden caused by negative stress responses of the front-line health workers. In abrupt infectious disease outbreaks, the positive effect of resilience in different affected populations may be expected.

Declarations

Our research totally fits the scope of *Military Medical Research,* we mainly aimed to explore the health status of the military medical workers during the most prevalent infectious disease COVID-19. This manuscript has not been published or submitted for publication elsewhere, and all the authors have approved the manuscript for submission.

- **Ethics approval and consent to participate**

Written informed consent was obtained from every participant, our research procedures strictly abode by the basic principles of the medical ethics. However, we did not get ethic approval because the Wuhan Huoshenshan Hospital was a temporary hospital with no Clinical Research Ethics Committee.

- **Consent for publication**

Not applicable

- **Availability of data and materials**

The datasets used and analyzed during the current study are not available due to the privacy, but it can be obtained from the corresponding author on reasonable request.

- **Competing interests**

In this research, we don't have any competing interests.

- **Funding**

This project was supported by the 1·3·5 project for disciplines of excellence, West China Hospital, Sichuan University (ZYGD18009).

- **Authors' contributions**

RY and JYW conceived and designed the study, they had full access to all the data of this research; DHL and XMB took responsibility for the data collection; JYW and JC drafted the manuscript; LY and XM had revised the manuscript carefully to keep the accuracy. Every author had reviewed and approved the final version of the manuscript.

- **Acknowledgements**

At first, we thank the contributions made by every healthcare workers in Huoshenshan Hospital in Wuhan to restraining the COVID-19 pandemic in China. And we also would extend special thanks for every participants who are willing to complete our research regardless of the overloaded work.

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Abbreviations

COVID-19: Corona virus Disease 2019; WHO: World Health Organization;

SEM: structural equation modeling; FLMS: front-line medical staff

SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2;

SARS: severe acute respiratory syndrome; SAS: The Self-Rating Anxiety Scale; SRSS: The Self-Rating Scale of Sleep; MFI-20: The Multidimensional Fatigue Inventory;

CD-RISC: The Connor-Davidson Resilience Scale; GF: General Fatigue;

PF: Physical Fatigue; MF: Mental Fatigue; RM: Reduced Motivation;

RA: Reduced Activity; ANOVA: analysis of variance;

RMSEA: the root mean square error of approximation;

CFI: the comparative fit index; NFI: the normal fit index;

PNFI: the parsimany-adjusted normal fit index;

PCFI: the parsimany-adjusted comparative fit index; IFI: the incremental fit index; TLI: the Tucker-Lewis index; GFI: the goodness-of-fit index;

AGFI:the adjusted goodness-of fit-index;

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Tables

Table 1 Demographic and social characteristics data of the participants

Items		The experimental group		The control group	
		Number	Percentage(%)	Number	Percentage(%)
Age(years)	≤30y	19	34.5	29	48.3
	30y~40y	29	52.7	23	38.3
	≥40y	7	12.8	8	13.4
Gender	Male	11	20	11	18.3
	Female	44	80	49	81.7
Marital status	Single	16	29.1	14	23.3
	Married	39	70.9	46	76.7
Profession	Doctor	9	16.4	15	25
	Nurse	46	83.6	45	75
	Undergraduate or less	45	81.8	50	83.3
Education	Postgraduate or more	10	18.2	10	16.7
Work experience	≤10y	29	52.7	35	58.3
(years)	10y	26	47.3	25	41.7
Department	Intensive care unit(ICU)	30	54.5	60	100
	General isolation ward	25	45.5	/	/
Technical title	Primary	33	60	40	66.7
	Intermediate	15	27.3	14	23.3
	Senior	7	12.7	6	10
Current perceived	None	4	7.3	10	16.7
stress level	Seldom	18	32.7	23	38.3
	Medium	25	45.5	24	40
	Large	8	14.5	3	5
Current perceived health status	Very good	17	30.9	23	38.3
	Not bad	33	60	31	51.7
	General	5	9.1	6	10
Attitude to work in Wuhan	Strive for it	43	78.2	/	/
	Volunteer	12	21.8	/	/
Work duration	25d	26	47.3	/	/
in Wuhan	≥25d	29	52.7	/	/

Table 2 Anxiety, fatigue and resilience status between two groups

Items		The experimental group	The control group	*T* value	*P* value
		±*s*	±*s*		
Anxiety	Total anxiety scores	42.84±9.44	46.27±9.94	-1.896	0.573
Fatigue	Total fatigue scores	52.85±9.33	49.33±11.20	1.822	0.103
	GF	12.00±2.17	10.67±3.07	2.666	0.002*
	PF	10.45±2.09	10.08±2.74	0.810	0.005*
	RA	9.89±2.45	9.88±2.96	0.015	0.060
	RM	10.00±2.53	9.28±2.73	1.457	0.280
	MF	10.51±2.50	9.42±2.92	2.143	0.184
Resilience	Total resilience scores	67.58±11.75	65.42±14.54	0.873	0.077
	Tenacity scores	33.27±6.04	32.87±7.89	0.308	0.028*
	Strength scores	23.71±4.63	22.28±4.84	1.611	0.519
	Optimism scores	10.60±2.27	10.27±2.74	0.708	0.061

"*", $P<0.05$.

Table 3 Comparison of the SAS, MFI-20 and CD-RISC among different clusters

Items		Fatigue			Resilience			Anxiety		
		±*s*	*T/F* value	*P*-value	±*s*	*T/F* value	*P*-value	±*s*	*T/F* value	*P*-value
Age	≤30y	52.63±8.86	0.110	0.89	65.79±11.56	1.29	0.283	41.89±7.49	0.14	0.87
	30y~40y	52.62±9.14			67.21±12.34			43.38±10.44		
	≥40y	54.43±12.48			74±8.54			43.14±10.72		
Gender	Male	56.91±9.05	1.64	0.92	67.91±9.59	0.102	0.194	42.09±6.17	-0.29	0.057
	Female	51.84±9.23			67.50±12.33			43.02±10.10		
Technical title	Primary	52.06±9.65	-0.77	0.309	67.88±13.27	0.227	0.057	41.88±8.39	-0.924	0.203
	Intermediate and above	54.05±8.93			67.14±9.31			44.27±10.78		
Working duration in Wuhan	25d	47.46±8.78	-4.82	0.047*	66.92±11.86	-0.39	0.92	43.12±9.38	0.21	0.49
	≥25d	57.69±6.93			68.17±11.84			42.59±9.58		
Profession	Doctor	55.33±10.95	-0.87	0.83	71.11±6.72	-0.99	0.050	42.44±8.76	0.14	0.69
	Nurse	52.37±9.04			66.89±12.44			42.91±9.61		
Marital status	Married	52.13±9.88	-0.89	0.054	67.56±11.16	-0.02	0.34	43.41±9.74	0.703	0.57
	Single	54.63±7.86			67.63±13.49			41.44±8.67		
Work experience(years)	≤10y	53.03±8.59	0.15	0.194	67.79±12.89	0.14	0.28	41.90±7.92	-0.78	0.071
	10y	52.65±10.26			67.35±10.58			43.88±10.89		
Department	Intensive care unit(ICU)	53.04±9.76	0.133	0.85	69.52±10.49	1.12	0.403	42.76±10.15	-0.05	0.205
	General isolation ward	52.70±9.13			65.97±12.66			42.90±8.91		
Attitude to work in Wuhan	Strive for it	51.56±9.59	-2.0	0.026*	69.30±11.29	2.12	0.75	42.93±10.05	0.14	0.17
	Volunteer	57.50±6.83			61.42±11.77			42.5±6.96		
Current perceived stress level	None	48.5±11.50	1.511	0.223	74.5±17.29	1.112	0.353	35.0±5.35	2.73	0.054
	Seldom	50.44±9.27			69.50±13.33			39.72±7.05		
	Medium	55.64±8.93			64.80±10.29			45.20±10.53		
	Large	51.75±8.88			68.50±8.78			46.38±8.63		
Current perceived health status	Very good	50.94±9.93	0.87	0.425	74.71±11.36	7.64	0.001*	38.65±9.10	3.87	0.027
	Not bad	53.21±9.52			65.73±10.03			43.85±9.00		
	General	57.0±4.30			55.6±11.01			50.40±7.73		
Education	Undergraduate or less	52.31±9.14	-0.92	0.77	66.4±12.12	-1.61	0.19	43.18±9.55	0.57	0.97
	Postgraduate or more	55.30±10.33			72.9±8.49			41.3±9.02		

"*", *P*<0.05.

Table 4 Direct and indirect effect of the SEM

Path	Estimate	Standard error	Critical ratio	*P*-value	95% confidence interval
Fatigue <— Resilience	-0.129	0.060	-2.139	0.032	-0.564 -0.026
Anxiety <— Resilience	-0.026	0.016	-1.592	0.043	-0.906 -0.294
Physical burden <— Resilience	-0.273	0.127	-2.146	0.052	-0.752 0.009
Physical burden <— Fatigue	0.200	0.258	0.775	0.438	-0.148 0.584
Anxiety <— Fatigue	0.016	0.017	0.942	0.346	-0.271 0.391
Anxiety <— Physical burden	0.02	0.023	0.868	0.385	-0.097 1.078
Resilience—>Fatigue —> Anxiety	-0.146	0.212	/	0.039	-0.906 -0.239
Fatigue —> Physical burden —> Anxiety	0.033	0.101	/	0.404	-0.271 0.391

Figures

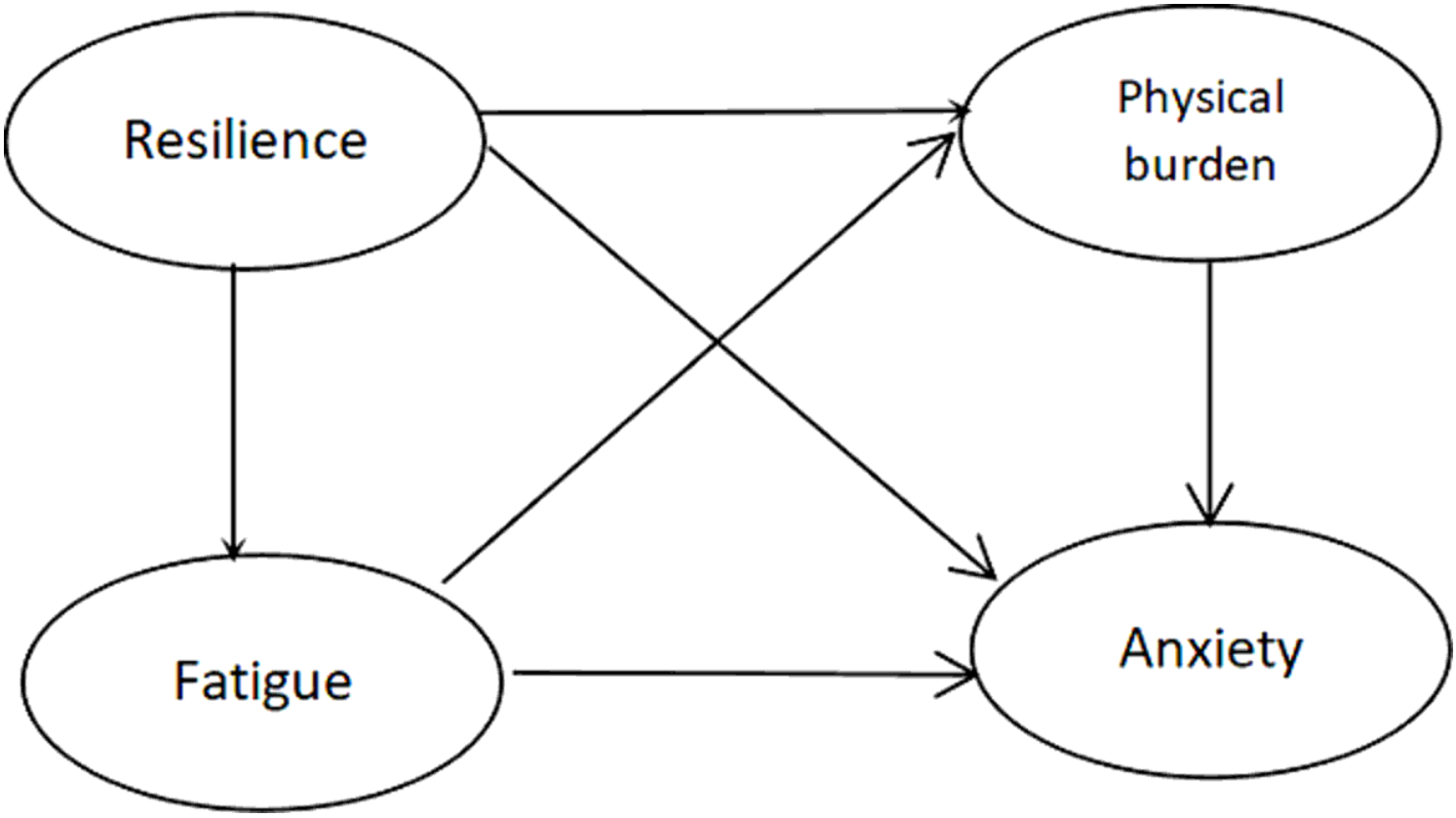

Figure 1

Conceptual diagram for the proposed model concerning structural relations of the latent variables

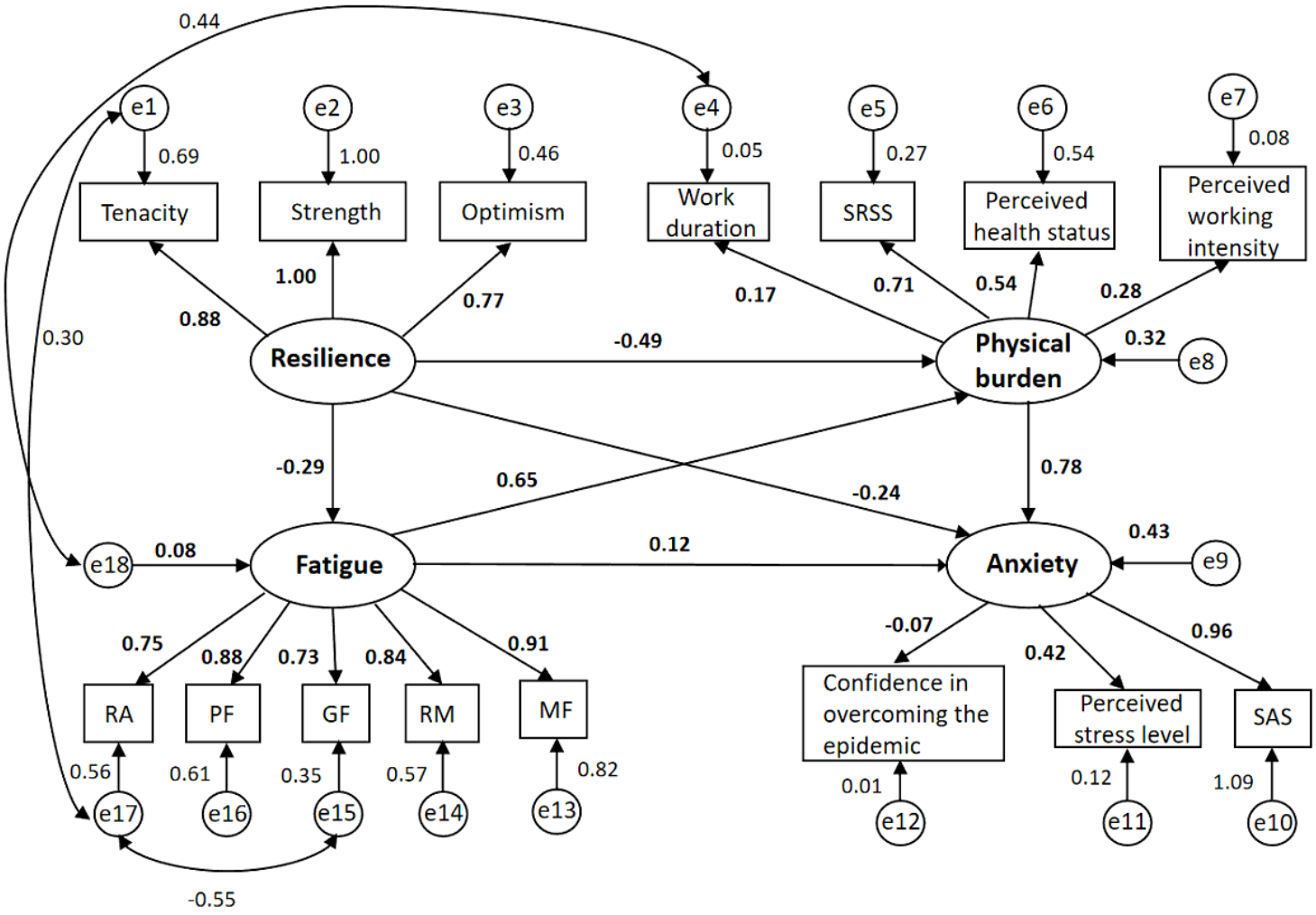

Figure 2

The standardization coefficient of the SEM for the experimental group