

# Self-efficacy and fatigue among health care workers during COVID-19 outbreak: A moderated mediation model of posttraumatic stress disorder symptoms and negative coping

Tianya Hou (✉ [liumi9512@126.com](mailto:liumi9512@126.com))

Centro Universitario de la Defensa en la Escuela Naval Militar de Marín <https://orcid.org/0000-0001-7361-1935>

**Wei Dong**

Naval medical university

**Ruike Zhang**

Naval Medical University

**Xiangrui Song**

Naval Medical University

**Fan Zhang**

Naval Medical University

**Wenpeng Cai**

Naval Medical University

**Ying Liu**

Naval Medical University

**Guanghai Deng**

Naval Medical University

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## Research article

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# Abstract

**Background.** Health care workers (HCWs) fighting Coronavirus Disease 2019 (COVID-19) are not immune to fatigue. Self-efficacy has been suggested as a protective factor for fatigue. Nonetheless, less is known regarding the underlying mechanisms behind the association. This research aimed to explore the prevalence of fatigue among HCWs during the pandemic, investigate the mediating effect of posttraumatic stress disorder (PTSD) symptoms and moderating effect of negative coping in the association between self-efficacy and fatigue.

**Methods.** The cross-sectional study employed a sample of 527 HCWs from Anhui Province, China. Self-efficacy, PTSD symptoms, negative coping and fatigue were measured by General Self-Efficacy Scale (GSES), PTSD Checklist-Civilian Version (PCL-C), Simplified Coping Style Questionnaire (CSCQ) and 14-item Fatigue Scale (FS-14) respectively.

**Results.** The prevalence of fatigue among HCWs was 56.7%. The effect of self-efficacy on fatigue was partially mediated by PTSD symptoms. Additionally, negative coping moderated both the direct effect of self-efficacy on fatigue and the mediating effect of PTSD symptoms. As revealed by Johnson-Neyman technique, when the standard score of negative coping enhanced to 1.49 and over, the direct association between self-efficacy and fatigue was not significant. Likewise, the effect of self-efficacy on PTSD symptoms had no statistical significance when the standard score of negative coping was  $-1.40$  and lower.

**Conclusions.** More than half HCWs suffer from fatigue during the COVID-19. For HCWs during the COVID-19 epidemic, especially those with higher levels of negative coping, it might be crucial to design program combining the enhancement of self-efficacy and interventions for PTSD to reduce fatigue.

## Background

On the last day of 2019, Coronavirus Disease 2019 (COVID-19) with unknown etiology was first reported in Wuhan, China [1]. On 30 January, 2020, the COVID-19 outbreak was declared a Public Health Emergency of International Concern [2]. The outbreak as a global health threat rapidly spread [3] and more than 1 million confirmed cases have been reported from almost every country. A near exponential growth in the number of new confirmed cases has been witnessed over the past few weeks [1]. The COVID-19 epidemic is straining health care systems with the escalating demand on health care workers (HCWs) and health facilities. The availability of local professional HCWs would largely determine whether the pandemic could be defeated [4] and it is of great importance to maintain and enhance the efficiency, quality and safety in the health sector amid COVID-19 outbreak. Work-related fatigue as a longstanding problem in health care settings was associated with reduced vigilance and poor work performance [5], which would enhance the incidence of medical errors and jeopardize work efficiency and quality. Owing to the shortage of HCWs and overwhelming number of confirmed cases during the COVID-19 pandemic, HCWs need to work overload and face numerous stressors, which makes them more vulnerable to

experience fatigue [6]. According to the literature regarding the 2003 severe acute respiratory syndrome (SARS) pandemic, the prevalence of fatigue was 22.1–70.3% [7, 8]. Hence, there is an urgent demand on investigating the influential factors and underlying mechanisms of fatigue in order to design targeted interventions against fatigue.

Fatigue as a multidimensional state could be caused by numerous factors, which makes the identification of underlying mechanisms challenging [9]. A two-stage approach to manage fatigue has been proposed. The first stage is to deal with treatable factors while the second stage is to address residual fatigue. Fatigue has been widely studied based on clinical samples and self-efficacy has been identified as one of the influential nonpharmacological factors [10, 11]. Self-efficacy is defined as the belief of one's capacity to successfully accomplish specific goals [12]. Numerous studies have suggested the enhancement of self-efficacy could be particularly effective in ameliorating fatigue [13] since it could protect against the adverse influence of stressors [14]. However, there is a lack of knowledge regarding the association between self-efficacy and fatigue among HCWs during the pandemic. In addition, the mechanisms behind the association are not well-understood.

Apart from fatigue, HCWs are also vulnerable to develop post-traumatic stress disorder (PTSD), a psychiatry disorder caused by the witness or experience of traumatic events, due to the exposure to the threats of life, the witness of the death of patients and colleagues and the fear of being infected during the COVID-19 pandemic [15]. The most common PTSD symptoms are recurrent memory regarding traumatic events, avoidance and heightened arousal [16]. An extensive body of literature showed general self-efficacy was a significant predictor of PTSD symptom [17, 18]. Previous literature employed an induction task with false feedback technique, through which participants were guided to believe they had low or high self-efficacy. After the induction, participants from high self-efficacy group presented better performance in problem solving [19]. More importantly, high self-efficacy participants showed less distress after the trauma film paradigm in comparison to those from low self-efficacy group [20]. In addition, a recent study conducted by Titcombe-Parekh et al. suggested the increase in self-efficacy could impact neural circuits with respect to executive function and regulation of emotion, which further contribute to the decrease of PTSD symptoms [21]. Furthermore, another recent research based on a sample of civilian war victims reported hyper-arousal and active avoidance symptoms of PTSD mediated the relation between exposure to trauma and somatic symptom such as fatigue since the PTSD symptoms might lead to enhancing muscle tension, increasing alertness of pain and negative appraisals towards experience [22, 23]. Thus, it is possible that PTSD symptoms mediated the association between self-efficacy and fatigue of HCWs during the outbreak.

Coping style is defined as the thoughts or behaviors individual adopts to handle the adversity and stress [24], which is considered to be consistent over time [25]. An emerging body of studies provided evidence regarding the interaction effect of self-efficacy and coping style [26], which indicated that the effect of self-efficacy might be influenced by coping style. Besides, according to the integrative framework of coping process, self-efficacy and coping style are interrelated to determine health outcome [27]. As proposed by Levin et al. [28], the association between self-efficacy and health outcome might be different

depending on the coping strategies adopted. Nonetheless, it remains unexplored whether negative coping style plays a moderation in the effect of self-efficacy on PTSS and fatigue among HCWs during the COVID-19 epidemic. Also, the results found that avoidant coping moderated the effect of self-efficacy on health outcomes, whereas positive coping failed to moderate the association [28]. Moreover, previous literature presented consistent results regarding the relation between negative coping and health outcome and the inconsistent results concerning the effect of positive coping on health outcome since the effectiveness of positive coping is a more crucial determinant in the positive outcome [29, 30]. Therefore, the current study would only focus on the moderating effect of negative coping as there was no method to measure the effectiveness of positive coping during the pandemic.

In sum, the current study aimed to explore the prevalence of fatigue among HCWs during the outbreak of COVID-19, investigate the mediating role of PTSD symptoms and the moderating role of negative coping in the association between self-efficacy and fatigue. Thus, we proposed a moderated mediation model (see Fig. 1) to address the hypotheses that PTSD symptoms might mediate the effect of self-efficacy on fatigue and negative coping might moderated the direct and/or indirect (self-efficacy – PTSD symptoms path) effect of self-efficacy on fatigue among HCWs during the COVID-19 pandemic.

<Figure 1 was inserted here>

## Methods

### Participants

This cross-sectional survey was performed in Anqing City, Anhui Province, China. The city borders Hubei province, the epicenter of the COVID-19 outbreak. All data were collected between March 13 - 20, 2020, more than 2 months after the outbreak of COVID-19. Cluster sampling procedure was adopted to recruit a total of 528 HCWs through local Health Commission. The inclusion criteria were a) having participated in the fight against COVID-19, b) age > 18. Finally, 527 subjects were included in the analysis (effective response rate 99.8%). The study was approved by the research ethics committee of Naval Medical University. Before filling out the online questionnaires, informed written consent was obtained from each participating HCW. In order to protect HCWs privacy and encourage honest reporting, the questionnaires were finished anonymously. In addition, participants were told the participation was voluntary and they could withdraw at any time.

### Measures

#### Self-efficacy

The Chinese version of the General Self-Efficacy Scale (GSES) developed by Zhang and Schwarzer [31] was used to measure self-efficacy. The scale consists of 10 items with only one dimension and each item is scored on a 4-point Likert scale from 1 (not true at all) to 4 (exactly true). The range of the total scores

is 10-40, with higher scores indicating higher level of self-efficacy. The scale has been demonstrated with good construct validity, impressive test-retest reliability and excellent internal consistency in the Chinese samples [31, 32]. In the present study, the Cronbach's Alpha for GSES was 0.900.

### **PTSD symptoms**

PTSD symptoms were measured by PTSD Checklist-Civilian Version (PCL-C) [33]. The scale consists of 17 items with three subscales (re-experiencing, avoidance and hyperarousal). Each item is rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). The 17 items were summed to create a total score representing the severity of PTSD symptoms, with higher scores denoting more severe PTSD symptoms. The Chinese versions of the scale has presented high internal consistency and adequate convergent validity [34]. The Cronbach's Alpha in the present study for PCL-C was 0.963.

### **Negative coping**

Negative was assessed by the negative coping subscale of Simplified Coping Style Questionnaire (CSCQ), which consists of 8 items [35]. Participants rated each item on a 4-point Likert scale ranging from 0 = never used to 3 = often used. The average score of the 8 items indicated the tendency to use negative coping. Higher scores of negative coping represents that the participants are more likely to use negative coping. The negative coping subscale has shown good internal consistency and test-retest reliability [35]. In the current study, the Cronbach's Alpha for CSCQ was 0.804.

### **Fatigue**

The 14-item Fatigue Scale (FS-14) was employed to evaluate fatigue [36]. The scale includes physical and mental fatigue subscales with 8 and 6 items respectively. Each item describes a symptom which is relevant to fatigue. Participants rated each item with two responses: 0 (no symptom) and 1 (having symptoms). The total score is 0-14 points. According to the previous literature based on Chinese samples [37], a cut-off  $\geq 7$  indicated the caseness of fatigue. The Chinese version of the scale has been widely used in health care settings with good validity and reliability [6, 38]. In the study, the Cronbach's Alpha for FS-14 was 0.907.

### **Covariates**

In the current study, the covariates included age, gender, marital status, educational level, years of working and technical title. Age was grouped into 20-29 years, 30-39 years, 40-49 years and 50-59 years.

Marital status was divided into unmarried (single, divorced and widowed) and married. Educational level was categorized into two groups: high school or under and university or above. Years of working was divided into 10 years or less and more than 10 years. Technical title was classified into three groups: junior, intermediate and senior.

## Statistical analysis

Firstly, we used descriptive analyses to describe demographic and working characteristics. Independent t-test and one-way analysis of variance (ANOVA) followed by LSD post hoc test were used to compare group differences in fatigue. Secondly, bivariate correlations between all the study variables (self-efficacy, PTSD symptoms, negative coping and fatigue) were calculated by Pearson's correlation analyses. Thirdly, the mediation effect was examined according to Mackinnon's four-step procedure [39]. Four conditions need to be met: (1) a significant association between self-efficacy and fatigue; (2) a significant relationship between self-efficacy and PTSD symptoms; (3) a significant relationship between PTSD symptoms and fatigue while controlling for self-efficacy; (4) a significant coefficient for the indirect association between self-efficacy and fatigue via PTSD symptoms. The last condition was examined by the bias-corrected percentile bootstrap method[40], which produced 95% bias-corrected confidence interval (CI) with 5000 replacements. The effect would be determined if 95% CI does not include 0. Hayes PROCESS macro (Model 4)[40] was employed to estimate parameters for the mediation effect.

Finally, the moderated mediation effect was examined by Model 8 [40]. As mentioned above, the effects were established if 95% the bias-corrected bootstrap CIs of the interaction excluded 0. Then, Johnson-Neyman technique [41] was employed to plot the conditional effects and confidence bands at different values of negative coping. In addition, z-scores for each variable were calculated before the analysis. Furthermore, all models were controlled for age, gender, marital status, education, years of working and technical title. All statistical analyses were performed by SPSS 25.0 and two-tailed *P*-values less than 0.05 were regarded as statistical significance.

## Results

### Demographic and working characteristics and fatigue

The characteristics of the sample and the group comparisons on fatigue are presented in Table 1. Most HCWs were female (65.3%) and married (80.8), obtained the degree of university or above (67.2%), worked 10 years or less. The mean age of 527 HCWs was 34.86 (SD=8.67), ranging from 20 to 58 with 294 (55.8%), 178 (33.8), 55 (10.4) respondents reporting junior, intermediate and senior technical title respectively.

The prevalence of fatigue among HCWs was 56.7% (FS-14  $\geq$  7). There was significant difference in fatigue among different age groups ( $F = 3.176$ ,  $P = 0.024$ ). LSD *post hoc* test indicated HCWs aged 30-39

years presented significant higher fatigue than those aged 20-29 years and those aged 50-59 (all  $P < 0.05$ ). No significant differences were found in fatigue by gender, marital status, education, years of working and technical title (all  $P > 0.05$ ).

<Table 1 was inserted here>

### **Bivariate correlations between all the study variables**

As presented in Table 2, self-efficacy was negatively correlated with PTSD symptoms ( $r = -0.301$ ,  $P < 0.001$ ) and fatigue ( $r = -0.402$ ,  $P < 0.001$ ). PTSD symptoms were positively associated with negative coping ( $r = -0.336$ ,  $P < 0.001$ ) and fatigue ( $r = -0.402$ ,  $P < 0.001$ ). In addition, negative coping was positively related to fatigue ( $r = 0.143$ ,  $P < 0.01$ ). However, there was no significant association between self-efficacy and negative coping ( $P > 0.05$ ).

<Table 2 was inserted here>

### **Mediating effect of PTSD symptoms**

The study assumed PTSD symptoms would mediate the relationship between self-efficacy and fatigue. We followed Mackinnon's four-step procedure to examine the mediation effect (see Table 3). Firstly, self-efficacy was significantly associated with fatigue ( $\beta = 0.40$ ,  $P < 0.001$ ) (see Model 1 in **Table 3**). Secondly, self-efficacy was significantly related to PTSD symptoms ( $\beta = 0.30$ ,  $P < 0.001$ ) (see Model 2 in **Table 3**). Thirdly, PTSD symptoms were significantly correlated with fatigue when we controlled for self-efficacy ( $\beta = 0.50$ ,  $P < 0.001$ ) (see Model 3 in **Table 3**). Finally, the indirect effect of self-efficacy on fatigue via PTSD symptoms was significant ( $ab = -0.15$ ,  $SE = 0.03$ ,  $95\% CI = [-0.21, -0.10]$ ). The mediation effect accounted for 37.7% of the total effect. In sum, all four criteria for mediation effect have been met and PTSD symptoms mediated the effect of self-efficacy on fatigue of HCWs during the COVID-19 pandemic.

<Table 3 was inserted here>

### **Moderated Mediation effect analysis**

The study anticipated negative coping might play as a moderator in the direct and indirect (the first stage of the mediation pathway: self-efficacy – PTSD symptoms) effects of self-efficacy on fatigue. As presented in Table 4, the results of moderated mediation analysis showed the interaction of self-efficacy and negative coping had a significant effect on PTSD symptoms ( $\beta = -0.158$ ,  $P < 0.001$ ), which indicated that the relation between self-efficacy and PTSD symptoms was moderated by negative coping. The moderated mediation effect was established since the indirect pathway was moderated by negative coping [40]. Additionally, negative coping also moderated the direct effect of self-efficacy on fatigue ( $\beta = 0.075$ ,  $P < 0.05$ ).

<Table 4 was inserted here>

Table 4 also showed the conditional direct and indirect effects of self-efficacy on fatigue at different values of negative coping (1 SD below the mean, the mean, and 1SD above the mean). The direct effect of self-efficacy on fatigue was stronger at 1 SD below the mean of negative coping ( $\beta = -0.306$ , 95%CI: -0.391, -0.221) than 1SD above the mean ( $\beta = -0.157$ , 95%CI: -0.256, -0.058). As shown by Johnson-Neyman technique [41], negative coping would moderate the direct effect of self-efficacy on fatigue when the standard scores of negative coping were lower than 1.494, in which 95% CI did not contain zero (see Figure 2).

<Figure 2 was inserted here>

Nonetheless, the indirect effect of self-efficacy on fatigue was attenuated at 1 SD below the mean of negative coping ( $\beta = -0.090$ , 95%CI: -0.141, -0.051) in comparison to 1SD above the mean ( $\beta = -0.256$ , 95%CI: -0.332, -0.188). Johnson-Neyman technique presented that negative coping would moderate the association between self-efficacy and PTSD symptoms when the standard scores of negative coping were more than -1.401 as 95% CI did not include zero (see Figure 3).

<Figure 3 was inserted here>

## Discussion

The research based on a sample of HCWs during the COVID-19 epidemic investigated the prevalence of fatigue and explored the potential mechanisms underlying the association between self-efficacy and fatigue with PTSD symptoms and negative coping as the mediator and moderator.

The prevalence of fatigue among HCWs was 56.7%, which is higher than the study during the outbreak of SARS with an overall incidence rate of fatigue among paramedics of 44% in Toronto [8]. This could be attributed to higher infectivity and rapider transmission of COVID-19 than SARS [42] with more people being infected and heavier workload for HCWs during the COVID-19 outbreak. Interestingly, when it comes to the comparison with the prevalence of fatigue among HCWs in the non-epidemic period, the results were inconsistent. Considerable studies found the lower prevalence of fatigue ranging from 21.6 to 45.5% [43–46], whereas Da Silva et al. [47] reported the overall incidence rate of fatigue among nursing workers in Brazil was 52%, which is in line with our findings. Moreover, several research observed higher incidence rates of fatigue ranging from 83.7 to 91.9% [38, 48, 49]. The discrepancy might be explained by the different definitions of fatigues, diverse assessment tools, inconsistent cut-off points and so forth. For instance, Cai et al. [50] employed a score of 4 on a 11-item fatigue scales as the cut-off point to define the occurrence of fatigue, while O'Donnell et al. [46] measured fatigue through only one question via self-assessment of average level of fatigue during the previous week. These differences might be attributed to the different prevalence of fatigue among HCWs. However, there is no doubt that fatigue is a commonly

experienced symptom among HCWs during the COVID-19 outbreak and more attention should be paid to deal with this issue in order to maintain the work safety and efficiency in the health care settings.

Our results found there were significant differences in fatigue among different age groups. Specifically, the 30–39 years group HCWs reported significant higher level of fatigue in comparison to 20–29 years and 50 – 49 years groups, which is congruent with the previous literature [45, 50]. The older HCWs with richer working experience and stronger professional skills usually worked as group leaders to make decisions, whereas the 30–39 years group implemented the decisions with physical labor. In addition, the 30–39 years group HCWs took more responsibilities than the 20–29 years group since the younger HCWs might lack experience and sufficient professional knowledge and could not complete the work alone. Therefore, those reasons might explain the differences. In the current study, there was no gender difference in fatigue, which is consistent with previous literature [38]. However, several previous studies claimed that women were more likely to suffer from fatigue [6, 48]. The inconsistent results might be attributed to socio-economic status of HCWs. As Jenkins proposed [51], when controlling for socio-economic backgrounds, the gender difference in case rates would disappear. In addition, one of the genders might be under-represented in some studies [52], which might partially explain the difference.

In consistent with our hypothesis, this study demonstrated a partially mediating role of PTSD symptoms in the association between self-efficacy and fatigue, which indicated the potential mechanisms regarding how self-efficacy would indirectly affect fatigue. HCWs with low self-efficacy could not only directly contribute to higher level of fatigue, but also indirectly aggravate fatigue via PTSD symptoms. This is consistent with the previous literature regarding the protective role of self-efficacy in PTSD symptoms and the positive association between PTSD symptoms and fatigue [17, 22]. This study extended the previous literature by combining self-efficacy as a protective factor and PTSD symptoms as a risk factor to explore fatigue, which has profound implications for the prevention and mitigation of fatigue of HCWs. The self-efficacy-based program and intervention for PTSD could be designed to reduce the occurrence of fatigue during the COVID-19 pandemic, which might further decrease the medical errors and enhance the work quality.

More importantly, the moderated mediation analysis presented negative coping as a relatively stable trait could moderate the direct and indirect effects of self-efficacy on fatigue of HCWs. This is in line with the integrative framework of coping behaviors and the previous study [27, 28], which suggested the moderating role of coping style in the link between self-efficacy and health outcomes. To the best of our knowledge, this is the first study to explore such moderated mediation effects. As revealed by Johnson-Neyman technique, it is noteworthy that with increasing negative coping, the direct effect of self-efficacy on fatigue became weakened. When the standard score of negative coping enhanced to 1.49 and over, the direct association was not significant any more. In contrast, the indirect effect of self-efficacy on fatigue via PTSD symptoms strengthened as the level of negative coping increased. Likewise, Johnson-Neyman technique showed that the effect of self-efficacy on PTSD symptoms had no statistical significance when the standard score of negative coping was – 1.40 and lower. This adds to our understandings of fatigue with important practical implications. Interventions for PTSD should be

prioritized for HCWs with higher levels of negative coping as self-efficacy would be more likely to influence fatigue through PTSD symptoms.

Several limitations should be addressed. Firstly, this cross-sectional study failed to infer the causal relationship. The longitudinal or experimental studies should be conducted to further explore the relation. Secondly, the data were obtained through the self-report questionnaires, which might cause self-reported biases. Further study could collect data from diverse informants. Thirdly, the participants of our study were only from Anqing City, which might limit the generalization of the results to other areas. Further study would recruit subjects from diverse regions. Finally, as mentioned above, fatigue could be influenced by many factors [9]. Our model could just explain part of the variance. A more integrative model is suggested for future study.

## Conclusions

The prevalence of fatigue among HCWs during the COVID-19 outbreak was 56.7% in the study. PTSD symptoms partially mediated the effect of self-efficacy on fatigue. In addition, both the direct effect of self-efficacy on fatigue and the mediating effect of PTSD symptoms were moderated by negative coping. Specifically, the direct effect was weaker and the indirect effect was stronger for HCWs with higher level of negative coping. For HCWs who participated in fighting COVID-19, especially those with higher level of negative coping, it might be of vital importance to design program combining the improvement of self-efficacy and interventions for PTSD to reduce fatigue.

## Abbreviations

COVID-19

Coronavirus Disease 2019

HCWs

Health care workers

PTSD

Post-Traumatic Stress Disorder

GSES

General Self-Efficacy Scale

PCL-C

PTSD Checklist-Civilian Version

CSCQ

Simplified Coping Style Questionnaire

FS-14

14-item Fatigue Scale

## Declarations

## **Ethics approval and consent to participant**

This research was approved by the ethics committees of Naval Medical University, Shanghai, China. Informed written consent was obtained before survey.

## **Consent for publication**

Not applicable

## **Availability of data and materials**

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

## **Competing interests**

The authors declare that they have no competing interests

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## **Authors' contributions**

TH and WD participated in conception, design of the work, data interpretation and analysis, drafting the manuscript. RZ, XS and FZ participated in the acquisition and interpretation of data. WC and YL participated in the data analysis and all authors revised the draft. TH and GD made contribution to the concept and design of the study, acquisition of data, manuscript revision and supervision. All authors approved this final version to be published.

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## **Author details**

### **Affiliations**

Faculty of Psychology, Naval Medical University (Second Military Medical University), Shanghai 200433, China.

## **Corresponding author**

Correspondence to Guanghui Deng or Tianya Hou.

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## Tables

**Table 1**

Demographic and working characteristics of respondents ( $N=527$ ) and group comparisons on fatigue.

	Respondents		Fatigue Scores		<i>F/t</i>	<i>P</i> -value
	<i>n</i>	%	<i>M</i>	<i>SD</i>		
Gender					1.489	0.223
Male	183	34.7	7.14	4.43		
Female	344	65.3	7.64	4.51		
Marital status					1.425	0.233
Unmarried	101	19.2	6.99	4.64		
Married	426	80.8	7.58	4.44		
Education					0.108	0.742
High school or below	173	32.8	7.56	4.41		
University or above	354	67.2	7.42	4.52		
Years of working					0.714	0.398
10 years or less	272	51.6	7.31	4.61		
More than 10 years	255	48.4	7.64	4.35		
Age (mean=34.86, SD=8.67)					3.176	0.024
20-29	175	33.2	7.06	4.63		
30-39	213	40.4	8.16	4.46		
40-49	88	16.7	7.16	4.31		
50-59	51	9.7	6.49	4.09		
Technical title					2.233	0.108
Junior	294	55.8	7.15	4.59		
Intermediate	178	33.8	8.04	4.30		
Senior	55	10.4	7.35	4.36		

**Table 2**

Pearson's correlation among self-efficacy, PTSD symptoms, social support and fatigue (*N*=527).

	<i>M</i>	<i>SD</i>	1	2	3
Self-efficacy	26.34	4.24			
PTSD symptoms	31.25	12.52	-0.301***		
Negative coping	1.15	0.55	0.040	0.336***	
fatigue	7.47	4.48	-0.402***	0.576***	0.143**

\*\* *P* < 0.01

\*\*\*  $P < 0.001$

**Table 3**

Mediation analysis ( $N=527$ ).

Variables	Model 1(Fatigue)		Model 2 (PTSD symptoms)		Model 3(Fatigue)	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
Self-efficacy	-0.40***	-9.83	-0.30***	-7.20	-0.25***	-6.81
PTSD symptoms					0.50***	13.65
$R^2_{adj}$	0.161***		0.097***		0.382***	
F	15.441		9.053		41.61	

*Note:* All models are adjusted for age, gender, marital status, education, years of working and technical title.

\*\*\*  $P < 0.001$

**Table 4**

Conditional process analysis ( $N=527$ ).

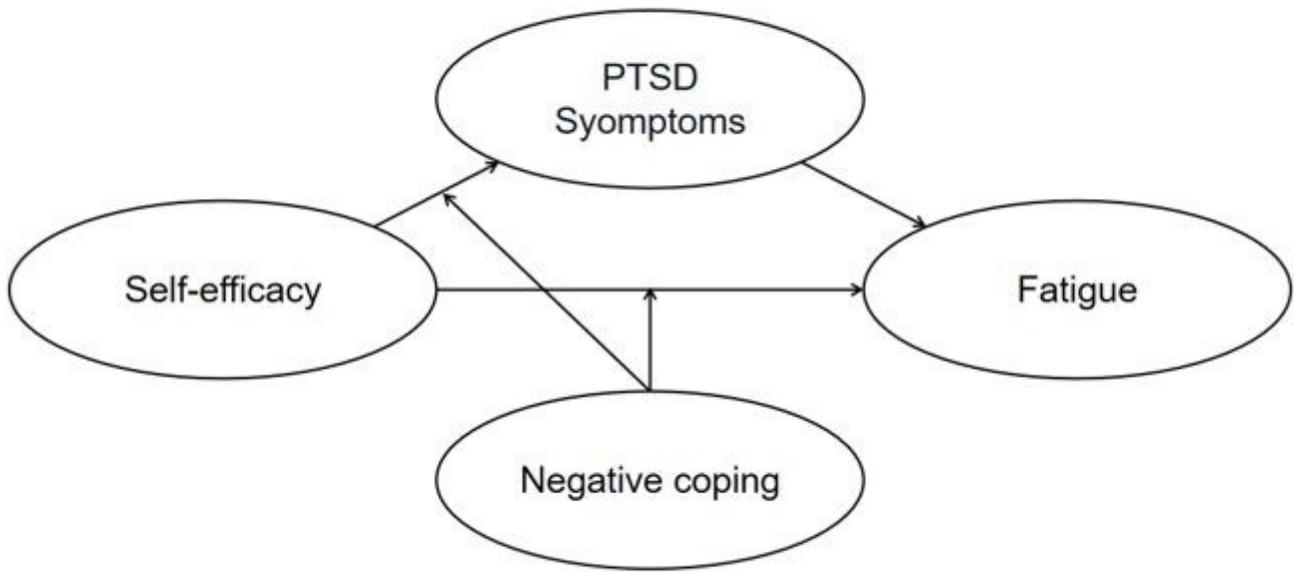
	$\beta$	<i>SE</i>	LLCI	ULCI
Mediator variable model (Outcome: PTSD symptoms)				
Self-efficacy	-0.331***	0.039	-0.406	-0.255
Negative coping	0.364***	0.038	0.289	0.439
Self-efficacy * Negative coping	-0.158***	0.031	-0.219	-0.097
Dependent variable model (Outcome: Fatigue)				
Self-efficacy	-0.232***	0.037	-0.305	-0.158
PTSS symptoms	0.523***	0.04	0.445	0.601
Negative coping	-0.028	0.038	-0.101	0.046
Self-efficacy * Negative coping	0.075*	0.029	0.018	0.131
	$\beta$	Boot <i>SE</i>	BootLLCI	BootULCI
Conditional direct effect analysis				
1 SD below the mean	-0.306	0.043	-0.391	-0.221
Mean	-0.232	0.037	-0.305	-0.158
1 SD above the mean	-0.157	0.051	-0.256	-0.058
Conditional indirect effect analysis				
1 SD below the mean	-0.09	0.023	-0.141	-0.051
Mean	-0.173	0.025	-0.227	-0.128
1 SD above the mean	-0.256	0.037	-0.332	-0.188
Index of moderated mediation	-0.086	0.017	-0.120	-0.054

Note: All models are adjusted for age, gender, marital status, education, years of working and technical title.

\*  $P < 0.05$

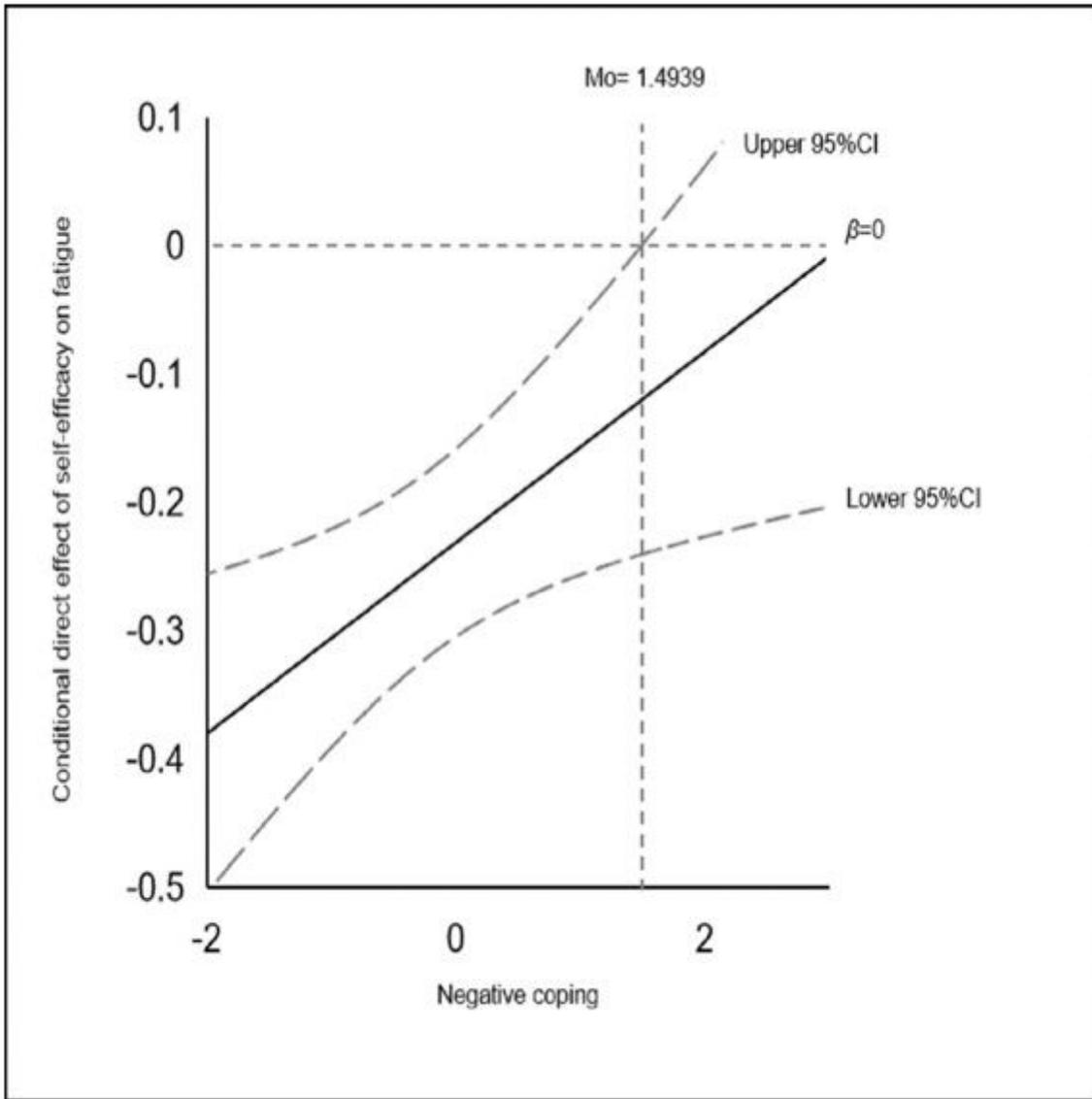
\*\*\*  $P < 0.001$

## Figures



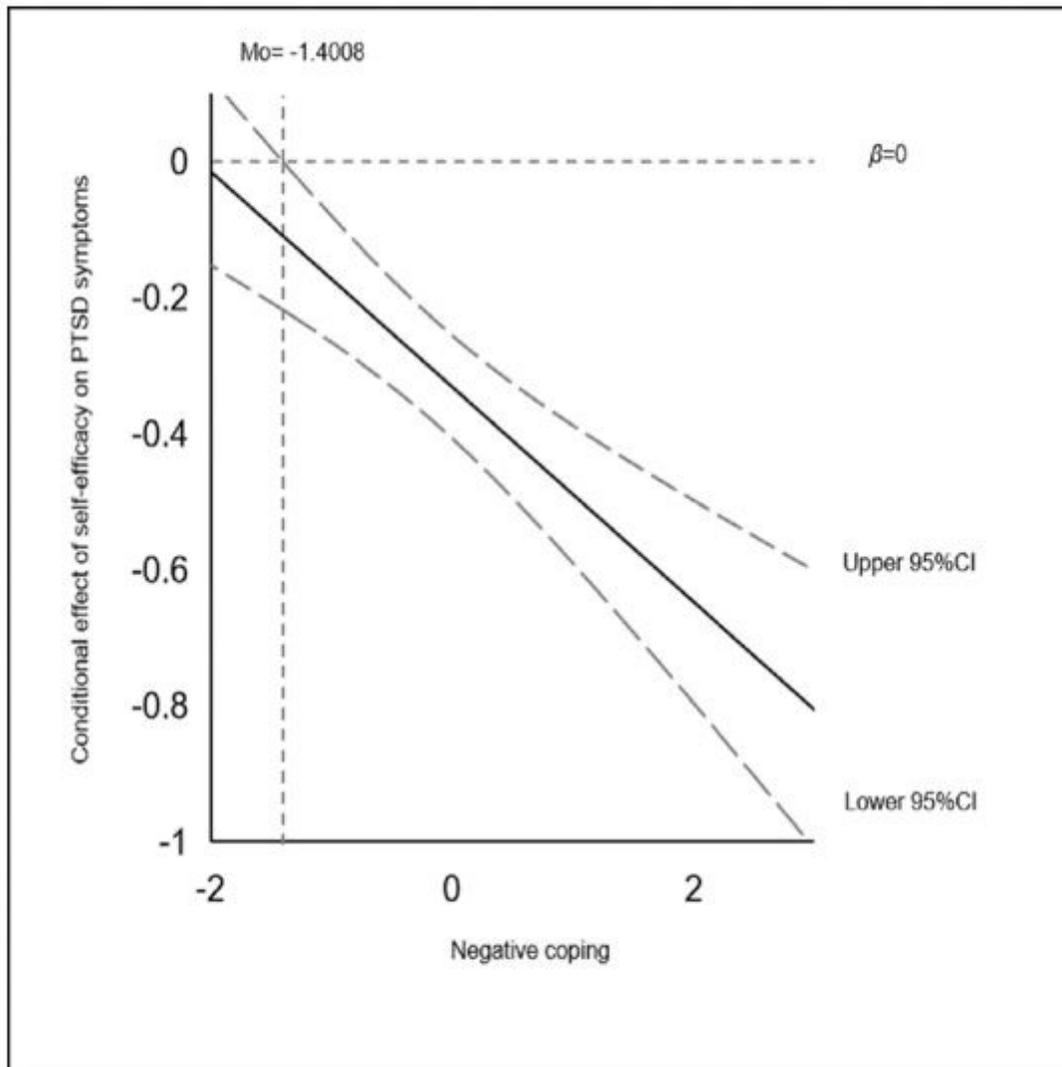
**Figure 1**

The schematic model of proposed moderated mediation model



**Figure 2**

The conditional direct effect of self-efficacy on fatigue at the values of negative coping.



**Figure 3**

The conditional effect of self-efficacy on PTSD symptoms at the values of negative coping.