

# Post-traumatic, Depression, Anxiety, and Stress Symptoms among Malaysian Firefighters

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## ABSTRACT

**INTRODUCTION:** Emergency responders, including firefighters are frequently exposed to life-threatening situations in their daily lives causing an increased risk for occupational stress, anxiety, depression and post-traumatic stress symptoms (PTSS). Hence, this study aimed to determine the prevalence, and correlation of PTSS with stress, anxiety, and depression among Malaysian firefighters.

**MATERIALS AND METHODS:** A cross-sectional study was conducted among firefighters stationed in 20 fire and rescue stations in Penang, Malaysia using self-administered online survey through a purposive sampling. Information collected were sociodemographic data, measurement of severity of PTSS via Post-Traumatic Checklist-5 (PCL-5), and assessment of depression, anxiety, and stress via Depression, Anxiety, and Stress Scale (DASS-21). A descriptive analysis and Pearson's correlation coefficient analyses were employed in study analysis.

**RESULTS:** Out of 562 firefighters participated in the study, the prevalence of PTSS, stress, anxiety, and depression was 5.0%, 2.1%, 13.0%, and 8.5%, respectively. Among those with PTSS, 28.6%, 78.6%, and 67.9% suffered from stress, anxiety, and depression, respectively. Hence, anxiety was highly coexisted with PTSS. There was significant positive correlation between PTSS score and the score of stress ( $r=0.656$ ,  $P< 0.001$ ), anxiety ( $r=0.699$ ,  $P< 0.001$ ), and depression ( $r=0.700$ ,  $P< 0.001$ ). **CONCLUSION:** Our study findings suggested that stress, anxiety, and depression can co-occur with PTSS. Hence, firefighters should have regular mental health assessments as the concurrent effect of multiple medical conditions may require comprehensive treatment to address the various aspects of each condition.

## Keywords

Anxiety, Depression, Firefighters, PTSS, Stress

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## INTRODUCTION

Firefighters often face challenges and risks in their line of duty, even during a single rescue situation, a potentially traumatic events can occur.<sup>1</sup> The traumatic events may result from providing aid to severely injured or helpless victims, sustaining serious injuries to oneself, coworkers, or victims, or being exposed to mortality and dying.<sup>1</sup> These traumatic situations may lead to work-related post-traumatic stress symptoms (PTSS) which can manifest with a range of symptoms, including intrusive memories, avoidance, negative changes in thinking and mood, and changes in reactivity and arousal.<sup>2</sup>

It is important to recognise that daily life or non-work-related factors can also contribute to psychological distress among firefighters.<sup>3,4</sup> The stressors for the psychological distress might include personal relationships, financial concerns, health issues, or societal pressures.<sup>5,6</sup> These stressors can accumulate over time and exacerbate psychological distress. The presence of one medical condition can lead to the development of another condition, while multiple conditions may exacerbate each other's symptoms, creating a cyclical pattern of exacerbations.<sup>7</sup> A simultaneously occurring of traumatic

stress and other psychological distress in an individual can be emotionally challenging and lead to greater functional impairment and reduced overall well-being.<sup>4,8</sup>

A burnout due to the demanding nature of the firefighting schedules could cause a work-life imbalance.<sup>9</sup> Stress can lead to intrusive memories of the traumatic event. The formation of intrusive memories pertaining to the traumatic incident is a symptom of PTSS. On the contrary, individuals with PTSS who experience these intrusive memories can also be highly distressing and further exacerbate stress.<sup>7</sup>

Firefighters may also experience anxiety when there is a need to perform their duties under pressure, as well as concerns about safety.<sup>4</sup> Anxiety can contribute to the development of PTSS. Likewise, individuals with PTSS with hypervigilance symptoms will also develop anxiety.<sup>4</sup> Besides, depression and PTSS are distinct mental health conditions. However, they are often comorbid, and their symptoms can interact with and reinforce each other.<sup>10</sup> This is because depression and PTSS share some common symptoms.

The coexistence of PTSS and other psychological distress like depression, anxiety, and stress may also pose challenges for individuals implementing healthy coping strategies and complicate the treatment process.<sup>11</sup> Limited coping strategies for managing cumulative stressors could make individuals vulnerable to any medical conditions.<sup>12</sup> Besides, treating multiple conditions simultaneously requires careful coordination and consideration of potential interactions between medications, therapies, and other interventions.<sup>11</sup>

The reported prevalence rate for PTSS in firefighters differs widely, from 4.2% to 57%.<sup>1,13</sup> The comorbidity of PTSS was also found in previous studies, with 39% to 97% suffering from comorbid anxiety and 21% to 94% suffering from comorbid depression.<sup>4,14,15</sup> In Malaysia, there is still a scarce report regarding the comorbidity or correlation of PTSS and other psychological distress in the domain of stress, anxiety, and depression among firefighters. This kind of report can alarm the respective

authorities about the need for early intervention and proper mitigation. Each condition should be addressed promptly and individually.

It cannot be denied that efforts are being made in the firefighting community to raise awareness about mental health, reduce stigma, and provide access to support and resources.<sup>16</sup> While progress is being made, addressing mental health issues among firefighters remains an ongoing concern, and more research and support are needed. Once mental health issues have been identified, stress management interventions may be implemented. Therefore, this study aimed to determine the prevalence of PTSS, stress, anxiety, and depression, and to investigate the correlation of PTSS with stress, anxiety, and depression among Malaysian firefighters.

## **MATERIALS AND METHODS**

### **Study Design and Study Population**

The study was a cross-sectional research conducted among firefighters in all 20 fire and rescue stations in Penang, a northern state in Peninsular Malaysia. A self-administered online questionnaires using the Google Forms platform was used as a study tool. A purposive sampling was employed to select the respondents, consisted of registered Fire and Rescue Department of Malaysia (FRDM) personnel with more than six months of work experience and the ability to read and write in Malay. Those who had been diagnosed with or received treatment for serious psychiatric disorders were excluded from the study.

### **Sample Size**

The StatCalc (Epi Info™) sample size calculator software calculated the sample size for this study. Sample size was calculated with a 95% confidence level, a 5% margin of error, and a 57% population proportion.<sup>1,13</sup> The population proportion of 57% was selected because it was the highest prevalence value of PTSS in the previous study.<sup>13</sup> Based on that infinite calculation, the calculated sample size was 376 participants. Considering the dropout rate, enrolling more subjects to compensate for the potential dropouts is needed<sup>17</sup>; thus, another 30%

were added, making the sample required was 537 participants.

### **Study Instrument**

The following measures were self-administered in Malay language.

#### **Section A: Socio-demographic Data**

Information on socio-demography included age, gender, ethnicity, religion, marital status, rank, and years of service were collected.

#### **Section B: Post-traumatic Checklist-5 (PCL-5)**

PCL-5 with Life Event Checklist-5 (LEC-5) were developed by the Center for Traumatic Stress, US Veteran Affairs Department. The PCL-5 has 20 items that reflect the newly revised DSM-5 criteria.<sup>18</sup> With permission, translated Malay versions of PCL-5 and LEC-5 were used for this study.<sup>19,20</sup> LEC-5 is a checklist of the most common work-related traumatic events that may be experienced by firefighters. The PCL-5 results are invalid if this checklist remains blank. The PCL-5 items are rated using a five-point Likert scale, with responses ranging from 0 (not at all) to 4 (extremely). A total score of 35 or higher suggests the presence of PTSS across samples, whereas scores below 35 may indicate that the respondent has subthreshold PTSS or does not satisfy the criteria for PTSS. A recent study among Malaysian firefighters demonstrated that the PCL-5 is a psychometrically sound instrument with excellent internal consistency (Cronbach's alpha = 0.96) and that the Cronbach's alpha ranged from 0.827 to 0.926 for individual constructs.<sup>21</sup>

#### **Section C: The Depression, Anxiety, and Stress Scale (DASS-21)**

DASS-21 was developed to collect data on psychological distress. The DASS-21 is a 21-item self-report scale designed to assess psychological conditions in the domains of depression, anxiety, and stress.<sup>22</sup> The Malay translation of DASS-21 was utilised for this study.<sup>23</sup> Based on previous research among multiracial Malaysian citizens, DASS-21 displayed good validity and reliability, with Cronbach's alpha values of 0.84, 0.74, and 0.79,

respectively, for depression, anxiety, and stress. It also has good factor loading, ranging from 0.39 to 0.73, and good correlations among the scales (0.54 and 0.68).<sup>23</sup> The interpretation of DASS-21 has been divided into five dimensions which is normal, mild, moderate, severe and extremely severe.

### **Data Collection Procedures**

Data collection was commenced from June 2023 to August 2023. The representatives from each fire and rescue station in Penang agreed to forward the Google Form link to reach the firefighters from the sampling frame through the WhatsApp medium. The link consisted of a participant's information sheet, an online consent form, and the online survey questionnaire. The participant's information sheet provided information about the study, including the research objectives, risks and benefits of participating in this research, and confidentiality. After respondents gave their consent to participate in the study, they completed the self-administered online survey. No financial incentives of any kind were provided for participation in the study. All data were included for analysis.

### **Data Analysis**

The Statistical Package for the Social Sciences (SPSS) version 24.0 software was used to analyse the obtained data. A descriptive statistic summarised the demographic data obtained from the participants and was presented as frequency and percentage. PTSS in this study was defined when respondents scored  $\geq 35$  in the PCL-5 survey.<sup>21</sup> A Pearson's correlation test was done to test the correlations of PTSS with stress, anxiety, and depression. Since the correlation was done to examine the strength of the linear relationship between two continuous variables, the levels of stress, anxiety, and depression were regrouped into the presence of a condition or the absence of a condition. The presence of stress, anxiety, or depression was categorised from moderate to extremely severe based on groupings from previous study.<sup>24</sup> Hence, the threshold score for stress was  $\geq 19$ , anxiety was  $\geq 10$ , and depression was  $\geq 14$ . The prevalence of PTSS, stress, anxiety, and depression symptoms were reported. A *P*-value of less than 0.05 in Pearson's correlation test is

considered statistically significant with a 95% confidence interval (CI).

## RESULTS

### Socio-Demographic Characteristics of Respondents

A total of 562 firefighters were recruited into the study. The study participants were aged between 22 to 60 years old with majority them in the age group of 31 to 40 (38.6%), males (97.3%,  $n=547$ ), Malays (95.0%), Muslims (96.3%), and married (88.8%). Majority of them hold fire officer rank (57.3%), with years of service between 10 and 19 years (37.4%), followed by 20 to 29 years (28.6%). All of them were already exposed to work-related traumatic cases based on their marking on LEC-5, with more than half of the respondents (67.6%) having experienced less than 10 types of traumatic cases. Table I outlines the characteristics of the respondents.

**Table I:** Socio-demographic characteristics of respondents ( $n=562$ )

Variables/Categories	Frequency (%)
Age	
21-30	121 (21.5)
31-40	217 (38.6)
41-50	169 (30.1)
51-60	55 (9.8)
Gender	
Male	547 (97.3)
Female	15 (2.7)
Occupational Rank	
Fire Officer	322 (57.3)
Senior Fire Officer	232 (41.3)
Lead Fire Officer	8 (1.4)
Years of Service	
1-9	149 (26.5)
10-19	210 (37.4)
20-29	161 (28.6)
30-39	42 (7.5)
Number of Case Variant	
1-10	380 (67.6)
>11	182 (32.3)

### The Prevalences and Coexistences of PTSS, Stress, Anxiety, and Depression

Based on the LEC-5 checklist, all respondents reported lifetime exposure to multiple traumatic events that met Criterion A of DSM-5, making all respondents eligible for other PTSD symptoms. Only 28 of the 562 respondents reported having PTSS based on the cut-off point of PCL-5. Thus, the prevalence of PTSS among respondents was 5.0%. The prevalence of stress, anxiety, and depression was 2.1%, 13.0%, and 8.5%, respectively. As shown in Table II, among those with PTSS, 28.6% suffered from

stress, 78.6% suffered from anxiety, and 67.9% suffered from depression. Hence, anxiety was shown to be highly coexist with PTSS.

**Table II:** Prevalences and coexistences of PTSS, stress, anxiety, and depression among respondents ( $n=562$ )

Mental Health Condition	Frequency (%)		Frequency (%)
	No PTSS ( $n=534$ , 95.0%)	PTSS ( $n=28$ , 5.0%)	
Stress			
No	530 (99.3)	20 (71.4)	550 (97.9)
Yes	4 (0.7)	8 (28.6)	12 (2.1)
Anxiety			
No	483 (90.4)	6 (21.4)	489 (87.0)
Yes	51 (9.6)	22 (78.6)	73 (13.0)
Depression			
No	505 (94.6)	9 (32.1)	514 (91.5)
Yes	29 (5.4)	19 (67.9)	48 (8.5)

### Correlation Between PTSS and DASS Scores

The correlation between PTSS, stress, anxiety, and depression is shown in Table III. Pearson's correlation analysis showed that stress ( $r=0.656$ ,  $P<0.001$ ), anxiety ( $r=0.699$ ,  $P<0.001$ ), and depression ( $r=0.700$ ,  $P<0.001$ ) were significantly correlated with the PTSS score. The observed Pearson's correlation coefficient ( $r$ ) suggested that there is a significant linear and strong positive correlation between PTSS and stress, anxiety, and depression. This positive correlation shows a consistent pattern where higher values of the PTSS score will increase the DASS scores.

**Table III:** The correlation between PTSS and DASS scores among respondents

Variables	Pearson's Correlation Coefficient	P-value
Stress	0.656	<0.001
Anxiety	0.699	<0.001
Depression	0.700	<0.001

## DISCUSSION

Almost all the respondents in this study were male, Malays, Muslims, and married, which closely described the population of Malaysian firefighters.<sup>25</sup> The results might not be biased since this study managed to represent the diversity of sociodemographic characteristics within the target population. Perhaps the findings could be generalizable to the entire population.

The prevalence of PTSS among Malaysian firefighters exposed to traumatic stressors in the state of Penang was 5.0%, in which the figure was markedly lower than previous study conducted in the state of Selangor (42.0%).<sup>21,25</sup> This may be due to the fact that the total number of emergency events received by firefighters

in Selangor was five times higher than in Penang, as per the annual report by the Ministry of Housing and Local Government.<sup>25</sup> Most respondents also experienced less than 10 types of traumatic cases throughout their services. In addition, there are 37 fire and rescue stations available in Selangor, compared to only 20 fire and rescue stations in Penang, which showed a higher population density in Selangor.<sup>25</sup> However, this prevalence was comparable to some studies among firefighters in small towns like southern Israel (5.7%), and the northeastern United States (4.2%).<sup>26,27</sup>

The prevalence of anxiety among Malaysian firefighters was higher compared to the prevalence of depression or stress. This result was similar to the previous study among Malaysian firefighters in the state of Negeri Sembilan, where the majority of the respondents were experiencing severe to extremely severe anxiety.<sup>6</sup> In the same study, the prevalence of severe and extreme stress was also the lowest.<sup>6</sup> This study also showed anxiety and depression are coexisting psychological conditions with PTSS, like in previous studies, since the percentage of coexistence is higher than 50%.<sup>1,4</sup>

This study found that stress, anxiety, and depression are significantly associated with PTSS. This finding was consistent with previous studies.<sup>1,28,29</sup> The correlation of depression and PTSS is significant because depression has a substantial amount of symptom overlap with PTSS.<sup>30</sup> Among those overlapping depression symptoms are trouble sleeping or keeping a focused mind, loss of interest in things previously used to enjoy, and avoiding being with other people as much.<sup>10</sup> The correlation between anxiety and PTSS is also significant because anxiety is a risk factor for developing PTSS, and those who already have PTSS and are experiencing hypervigilance symptoms are more likely to acquire anxiety.<sup>31</sup> The correlation between stress and PTSS is also significant. Stress can potentially contribute to the development of PTSS, and conversely, experiencing PTSS can further exacerbate stress levels.<sup>7</sup> Hence, the possibility of having both PTSS and severe DASS levels at the same time is higher.

The major strength of this study is that the research focuses on a specific organisation. Hence, it is easier to design a procedure for respondent recruitment. In addition, this study received good cooperation from the targeted population due to its high response rate. Several limitations were identified in this study. As this is an online survey, we might only reach respondents who are internet savvy. Although the internet population is becoming more representative, age and educational factors may influence the different familiarity of possible respondents with internet protocols.<sup>31</sup> This study was designed as a cross-sectional study to determine the association between PTSS and other psychological morbidities. Thus, it prevented us from establishing causal inferences from the study results. Hence, future studies should attempt to include a qualitative study design or longitudinal study to understand the correlation between PTSS and other psychological morbidities.

## CONCLUSION

In conclusion, the prevalence of PTSS, stress, anxiety, and depression seemed to be low. The study determined that symptoms of anxiety and PTS coexisted highly, due to the fact that the proportion of respondents with anxiety was the highest among those with PTSS. This study also revealed a positive correlation between PTSS and stress, anxiety, and depression. Compared to other variables, depression exhibited the highest correlation coefficient, suggesting a strong association between depression and the PTSS score. On the basis of these findings, PTSS may coexist with stress, anxiety, and depression. Therefore, this study proposes that regular mental health assessments and improved coping skills are essential for effective mental health management among Malaysian firefighters.

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## CONFLICT OF INTEREST

The authors declare no conflict of interests.

## INSTITUTIONAL REVIEW BOARD (ETHIC COMMITTEE)

Ethics approval was obtained from the Research Ethics Committee, Universiti Sains Islam Malaysia (USIM/JKEP/2023-246). Informed consent was obtained from all participants prior to data collection. All the data were kept confidential.

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