# Self-differentiation and Neurosis in Post-traumatic Stress Disorder among Firefighters

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**Original Article**

## Abstract

**INTRODUCTION:** Post-traumatic stress disorder (PTSD) is a mental disorder that emerges due to severe stressful events including flood, earthquakes, war, aggression, etc. Due to the nature of their job, firefighters are at high risk of developing complications and psychiatric problems, including PTSD. The present study was carried out aiming to compare self-differentiation and neurosis among firefighters with and without PTSD.

**METHODS:** The PTSD checklist developed by Weathers et al. was distributed among 180 firefighters directly active in the fire of the Plasco building in Tehran, Iran, in 2017. From among these individuals, 30 people with and 30 without PTSD were selected randomly. The participants completed the Differentiation of Self Inventory (DSI) developed by Skowron and Dendy and the Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ).

**FINDINGS:** There were no significant differences in terms of the components of emotional cutoff (EC) ($F = 0.973$, $P > 0.05$), emotional reactivity ($F = 0.404$, $P > 0.05$), fusion with others (FO) ($F = 0.338$, $P > 0.05$), and I-position ($F = 0.774$, $P > 0.05$) between firefighters with and without PTSD. In addition, there were no significant differences in terms of neurosis between firefighters with and without PTSD ($F = 0.034$, $P > 0.05$).

**CONCLUSION:** Being in highly stressful circumstances for a long duration of time (about 10 days) and cognitive, emotional, and environmental factors seem to expose this statistical sample to PTSD. Moreover, in the firefighting recruitment process, complete medical examinations are performed, which can be the reason for the low and equal levels of neurosis and differentiation of self in all individuals with and without PTSD.

**Keywords:** Post-traumatic Stress Disorder; Self-differentiation; Neurosis; Firefighters

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## Introduction

Job stress is one of the main factors in reduced productivity in organizations and the cause of physical and mental complications among employees (1).

Although job stress can be found more or less in all occupations, it is more prominent in professions dealing with human health (2).

Due to their specific responsibilities and emergency services, firefighters are confronted with various hazards such as high temperatures, chemicals, noise, etc. They frequently experience critical conditions and are exposed to accidents, injuries, and stress more than others. In addition, the frequency of damaging accidents in situations in which they are involved or witnesses to an incident increases with increasing work years; therefore, factors associated with job stress are important in this group (3).

Exposure to various accidents and injuries may cause anxiety and depression, post-traumatic stress disorder (PTSD), and other disorders (4).

PTSD is a mental disorder resulting from severe stressful events including flood, earthquakes, war, aggression, etc. (5).

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In different situations, individuals exhibit reactions such as severe fear, distress, or shock to stimuli that cause this disorder. Frequent reminiscence of damaging events, such as perceptions and mental images, as stimuli, exacerbates psychological discomfort, which results in a feeling of re-experience, illusion and hallucination, decreased interest or participation in important activities, feelings of aversion to others, and limited range of emotions. This disorder also leads to social and occupational impairment (6-10).

PTSD rates are higher among war veterans and individuals with difficult and perilous occupations, such as the police, firefighters, and medical emergency staff (11,12).

Approximately 5 to 6% and 10 to 12% of men and women, respectively, experience PTSD during their life (13). Most people (50-90%) remember a traumatic event until the end of their life, but only 8% of them experience PTSD (14,15).

According to Eysenck's theory, the behavior of individuals reflects the three dimensions of personality, including neuroticism, psychoticism, and extraversion (16).

Neuroticism is a personality factor representing severe emotional responses; the individual shows intense and long-term reactions to stress, and unstable symptoms of mood, irritability, excitability, sensitivity to minor issues, and anger and anxiety can be observed in these individuals (17).

Individuals with high scores in neurosis have more irrational beliefs, are less able to control stress, and show poor adaptability, choose lower targets, and have improper self-evaluation, in addition to showing less compatibility with stressful situations (18). Thus, neurosis can be used to predict PTSD (19).

Various studies regarding the relationship between personality traits and occupational stress have reported that predictive neurosis is a good predictor of occupational stress (20-25). Investigating the role of personality traits in predicting PTSD, Narimani and Basharpour showed a significant difference between people with PTSD and healthy people in terms of neurosis (26).

On the other hand, differentiation of self is a mode in which the individual is able to establish a balance between his/her rational and emotional functioning, or the dependence and independence of action in relationships. In fact, self-differentiation enhances the individual's awareness of his/her personality traits and in turn affects his/her performance. In general, individuals who are more aware of their abilities, constraints, strengths, and weaknesses, and differentiate themselves from others, are more successful in solving their problems (27-29).

Examining differentiation of self and severity of PTSD symptoms in war prisoners and their wives, Solomon et al. found that the war prisoners and their wives showed more symptoms compared to the control group (30). Moreover, the levels of emotional cutoff (EC) and fusion with others (FO) among the war prisoners, and only the level of FO in their wives were higher than those of the control group. As a result, the relationship between differentiation of self and PTSD in the war prisoners and their wives was more prominent than that in the control group participants (30).

In this study, given the lack of a previous study in this field, self-differentiation and neurosis were compared among firefighters with and without PTSD.

## Methods

In the current study, the statistical population included all the firefighters who were working in Tehran, Iran, in 2017 and were involved in the Plasco building fire. The target sample consisted of the firefighters operating in this incident for at least one daily shift from the beginning to the end of the incident for about 10 days. In general, there are 8 districts and 117 fire stations in the city of Tehran. Firefighters from 3 of the 8 districts were present at the Plasco building fire. Firefighters of district 5 had the highest activity in this incident. District 5 has 17 stations from among which 7 stations were selected by random sampling method.

Self-differentiation and neurosis were the independent variables and PTSD was the dependent variable of the study.

There are contradictory opinions on the appropriate sample size of the multivariate analysis of variance (MANOVA), some considering the size as more than the number of variables in each place, but this is the absolute minimum. Larger sample size prevents the diversion of the study and the violation of some other assumptions (such as normality). The minimum number of samples required in each district in this study was 5 (as the number of the dependent variables), and a total of 10 places (5 dependent variables in two levels), resulting in a



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minimum sample size of 10 subjects in each place. Some others suggested about 20 subjects for each place; given the number of subjects (30 subjects for each place), the sample was sufficient (31).

The PTSD checklist was distributed among all staff of the selected stations. Of the 180 individuals who had experienced the Plasco incident, 32 and 148 were identified with and without PTSD, respectively. Among them, 30 individuals with, and 30 individuals without the disorder were randomly selected.

The research tools included the Differentiation of Self Inventory (DSI) (32), Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ) (33), and the PTSD checklist developed by Weathers et al (34).

DSI is a self-report instrument used for differentiation of self by the individuals and focuses on adults, important life relationships, and current relationships of individuals with their main families. In addition, the DSI measures the level of differentiation of the individuals or their ability to differentiate rational and emotional processes. Askian obtained the reliability of this questionnaire as 0.81 with Cronbach's alpha coefficient (35).

Aghajani et al. reported the validity of this questionnaire as 0.84 and its convergent validity as 0.86 (36). The validity of this scale in the present study was 0.70, 0.69, 0.71, 0.64, and 0.87 for emotional reactivity, EC, FO, I-position, and the whole DSI, respectively.

The Neurosis Scale (EPQ) is exploited to assess the tendency toward emotional maladjustment and experience of negative emotions such as fear, hostility, and depression, and includes 12 items.

In his study on the Eysenck Neurosis Scale, Oyler reported the Cronbach's alpha coefficient of 0.90 in both student and staff group (37).

Nemat Tavousi and Akbarzade Hoori reported the correlation between self-esteem, generalized self-efficacy, self-restraint, and positive emotion to be significant as, respectively, 0.44, 0.61, 0.33, and 0.23, in addition to the Cronbach's alpha coefficient of 0.89 (38). In the present study, the validity of this scale was 0.92.

The PTSD checklist is also a self-report tool utilized as a diagnostic tool to evaluate disorder in individuals and screen them. The checklist was developed by Weathers et al. with 17 items; seven items are associated with signs of re-experiencing PTSD, emotional numbness, and severe stress, respectively. The validity of this checklist in Iran was obtained by Goudarzi for 117 subjects using Cronbach's alpha coefficient and halving methods as 0.93 and 0.88, respectively. Furthermore, in this study, Goudarzi reported the convergent validity of this checklist through calculating its correlation with the Mississippi Scale for Combat-Related Posttraumatic Stress Disorder and the life events list as, respectively, 0.93 and 0.37. In another study, the validity of this list was obtained as 0.94 (39).

The data were analyzed using descriptive statistics and statistical tests including Kolmogorov-Smirnov (K-S), MANOVA, and Pearson correlation coefficient in SPSS software (version 18, SPSS Inc., Chicago, IL, USA) at the significance level of $P < 0.05$.

## Findings

Of the 60 subjects in this study, 9 and 51 were single and married, respectively, and their level of education ranged from diploma to a master's degree. In addition, the age range of the subjects was 25 to 43 years, with an average age of 35.35 years. Moreover, their average job experience was 10.57 years with the range of 2 to 22 years.

The results of implementation of the DSI Short Form (DSI-SF) and the EPQ Neuroticism Scale in the two groups of firefighters with and without PTSD were specified as mean, standard deviation (SD), minimum, and maximum for each group and reported in Table 1.

**Table 1.** Summary of descriptive findings of self-differentiation and neurosis in the two groups of firefighters (n = 60)

| | With PTSD (n = 30) | | | | Without PTSD (n = 30) | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | Mean | SD | Min | Max |
| EC | 32.930 | 5.705 | 24 | 47 | 30.870 | 9.951 | 13 | 54 |
| Emotional reactivity | 35.470 | 5.519 | 23 | 43 | 34.370 | 7.703 | 18 | 47 |
| FO | 41.630 | 6.054 | 28 | 54 | 40.300 | 11.011 | 20 | 60 |
| I-position | 42.630 | 6.071 | 31 | 61 | 40.870 | 9.175 | 19 | 55 |
| Neurosis | 25.970 | 8.724 | 12 | 43 | 25.530 | 9.453 | 12 | 45 |

PTSD: Post-traumatic stress disorder; EC: Emotional cutoff; FO: Fusion with others; SD: Standard deviation



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**Table 2.** Summary of the Kolmogorov-Smirnov test

| | With PTSD (n = 30) | | Without PTSD (n = 30) | |
|---|---|---|---|---|
| | Statistic | Significance | Statistic | Significance |
| EC | 0.126 | 0.200 | 0.128 | 0.200 |
| Emotional reactivity | 0.138 | 0.147 | 0.113 | 0.200 |
| FO | 0.109 | 0.200 | 0.132 | 0.193 |
| I-position | 0.139 | 0.142 | 0.119 | 0.200 |
| Neurosis | 0.116 | 0.200 | 0.101 | 0.200 |

PTSD: Post-traumatic stress disorder; EC: Emotional cutoff; FO: Fusion with others
* P > 0.05, df = 30

***Investigation of MANOVA assumptions:*** To perform MANOVA, preliminary investigations were conducted to ensure the establishment of the assumptions of this test. Sample size, normality, outliers, multicollinearity and collinearity, homogeneity of variances, and homogeneity of variance-covariance matrices were among the MANOVA assumptions examined.

First, the normality assumption, which is the main assumption of all parametric tests, was assessed, although, given the sample size and the approximate equality of the two groups (30 in each group), the MANOVA test was resistant to the violation of the normality and the homogeneity assumptions of the variances. The K-S test was applied to ensure normality; the results are demonstrated in Table 2. The significance values were greater than 0.05 in all groups, indicating compliance with the normality assumption, and thus, the possibility of using parametric tests. Outlier score assumptions were previously evaluated and their absence was assured.

Multicollinearity and collinearity were among the other main assumptions of the MANOVA test. This assumption means that the correlation between the variables should not be too low or too high. For this assumption, the Pearson correlation test was executed, and the correlation coefficient between self-differentiation (EC, emotional reactivity, FO, and I-position) and neurosis are given in Table 3.

**Table 3.** Correlation coefficients of self-differentiation and neurosis

| Variables | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| EC | - | | | |
| Emotional reactivity | **0.732 | - | | |
| FO | **0.563 | **0.659 | - | |
| I-position | *0.259 | **0.341 | **0.554 | - |
| Neurosis | **0.423 | **0.465 | *0.264 | 0.081 |

PTSD: Post-traumatic stress disorder; EC: Emotional cutoff; FO: Fusion with others
* P > 0.05, * P > 0.01

Based on the results presented in Table 3, the self-differentiation components had a significantly positive correlation with each other and with neurosis (P > 0.05). These results indicate the establishment of the multicollinearity and collinearity assumption among the dependent variables. The assumption of homogeneity of the variance-covariance matrices was tested using the Box's M statistical test and, given the sensitivity of this statistical test, a more reliable alpha level (P > 0.001) was used. Taking into account the statistics obtained in the study variables (Box's M = 26.715 and F = 1.615 with degrees of freedom of df1 = 15 and df1 = 13544.526, and P > 0.05), it can be observed that the assumption of homogeneity of the variance-covariance matrices has not been violated.

To determine the homogeneity of variances between the two groups, Levene's F statistical test was evaluated, and the results of the homogeneity analysis of variances by the variables and comparison of the groups are presented in Table 4.

Based on the results of Levene's test, the F value was not significant in all variables between the groups, and hence, the assumption of homogeneity of the variances has not been violated. Overall, it can be claimed that the assumptions of the MANOVA test were established and the results of its implementation were valid.

**Table 4.** Homogeneity analysis of variances by the variables and comparison of the groups

| Variables | F | df1 | df2 | Sig |
|---|---|---|---|---|
| EC | 0.974 | 1 | 58 | 0.328 |
| Emotional reactivity | 1.856 | 1 | 58 | 0.178 |
| FO | 0.774 | 1 | 58 | 0.383 |
| I-position | 2.189 | 1 | 58 | 0.144 |
| Neurosis | 0.702 | 1 | 58 | 0.406 |

EC: Emotional cutoff; FO: Fusion with others; df: Degree of freedom

After examining the MANOVA test assumptions and ensuring the establishment of the conditions, MANOVA was performed and the results are displayed in Table 5.



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**Table 5.** Multivariate analysis of variance test results

| Variables | SS | Df | MS | F | P | ƞ² |
|---|---|---|---|---|---|---|
| EC | 64.067 | 1 | 64.067 | 0.974 | 0.328 | 0.017 |
| Error | 3815.333 | 58 | 65.762 | | | |
| Total | 3879.400 | 59 | | | | |
| Emotional reactivity | 18.150 | 1 | 18.150 | 0.404 | 0.527 | 0.007 |
| Error | 2604.433 | 58 | 44.904 | | | |
| Total | 2622.583 | 59 | | | | |
| FO | 26.667 | 1 | 26.667 | 0.338 | 0.563 | 0.006 |
| Error | 4579.267 | 58 | 78.953 | | | |
| Total | 4605.933 | 59 | | | | |
| I-position | 46.817 | 1 | 46.817 | 0.774 | 0.383 | 0.013 |
| Error | 3510.433 | 58 | 60.525 | | | |
| Total | 3557.250 | 59 | | | | |
| Neurosis | 2.817 | 1 | 2.817 | 0.034 | 0.854 | 0.001 |
| Error | 4798.433 | 58 | 82.732 | | | |
| Total | 4801.250 | 59 | | | | |

EC: Emotional cutoff; FO: Fusion with others; df: Degree of freedom; SS: Sum of squares

* P > 0.05

The MANOVA results showed that there was no significant difference between the two groups of firefighters with and without PTSD in terms of self-differentiation and neurosis. In addition, there was no significant difference in the components of EC, emotional reactivity, FO, and I-position among firefighters with and without PTSD. Moreover, there was no significant difference in terms of neurosis between firefighters with and without PTSD.

## Conclusion

The aim of conducting this study was to compare self-differentiation and neurosis between firefighters with and without PTSD. The results revealed no statistically significant differences in terms of differentiation of self between firefighters with and without PTSD. This finding is consistent with the results of the studies by Peleg and Zoabi (40), Carr (41), Beirami (42), and Shayeghan Motlagh (43), and in contrast with the results of the studies by Gratz et al. (44) and Kim et al. (45).

Despite the potential evidence regarding the presence of a relationship between PTSD and the causes of the disorder and its subsequent damage, few studies have investigated the relationship among these factors. However, Gratz et al. (44) and Kim et al. (45) revealed that the relationship of mental abilities and personality factors, including self-differentiation, with PTSD is not accurately known, and its clarification requires further investigations. In contrast, Shayeghan Motlagh (43), Peleg and Zoabi (40), Carr (41), and Beirami (42) also found that individuals lacking self-differentiation had high or chronic anxiety, and the likelihood of symptom of anxiety disorder is high in these individuals. Since the rate of PTSD is high among individuals with difficult and hazardous occupations, such as the police, firefighters, and medical emergency staff (11), the risk of developing PTSD seems to increase in this group of individuals. The presence of risk factors such as a history of childhood injury, lack of family support, and recent stressful life changes can contribute to the development of this disorder. Psychological, cognitive-behavioral, and biological factors are among the factors effective in the etiology of this disorder (5).

It seems that in addition to the individual's psychological characteristics, such as differentiation, there are other factors including recent stressful life changes (it can be abundantly observed in firefighting job and modern society), and biological, cognitive-behavioral, and cultural factors (in this statistical population, most of the employees had a relative or causal relationship with each other and benefited from relatively similar biological and cultural characteristics), as well as the severity, duration and frequency, and proximity of the individual to the damaging incident that contribute to this disorder.

The Plasco building fire incident lasted for about 10 days, and all the subjects participating in this study encountered this incident in at least one shift of work per day. Many of these individuals were faced with the death of a number of their

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colleagues (in some cases a family member) each day. They were exposed to a new crisis almost every day. Evidently, self-differentiated individuals are also less able to resist this disorder in the face of recurring and severe events.

Furthermore, psychological workshops are continuously being held in the firefighting organization. All of the firefighters attend these classes and this could be a cause of the identical and average levels of differentiation in the statistical sample of the present study.

The results obtained in the current study indicated that there was no significant difference in the levels of neurosis between firefighters with and without PTSD. This finding was inconsistent with the results of the studies carried out by Ogle et al. (46), Naragon-Gainey and Simms (47), Sheikhbardsiri et al. (11), Ghasemzadeh et al. (20), Ghanei Gheshlagh et al. (48), and Golestaneh et al. (19). However, it was in line with the studies by Floros et al. (49), and Coentre and Power (50), as they found no relationship between neurosis and PTSD, and no certain interaction between this personality trait and this disorder.

Although there is a weak link between pre-traumatic anxiety and PTSD (44), there are several factors, including cognitive, emotional, and environmental factors that are involved in how a neurotic person reacts to a traumatic event. These factors can contribute to the emergence and progression of PTSD or its reduction (50).

Exposure to previous traumatic events, individual perception, intelligence, personal injury, etc. can also be risk factors for this disorder (51).

In previous investigations, no significant difference was reported between firefighters with and without PTSD in terms of neurosis. The results of this study revealed that the levels of neurosis in the two groups were the same and relatively low. In the recruitment of firefighters, physical and psychological tests are widely used for selection. Since these medical examinations are carried out by the police, no detailed information on its results is available. However, it can be claimed that one of the most prominent reasons for low levels of neurosis in firefighters is the screening at the time of recruitment.

One of the limitations in this study was the lack of generalization of its results to individuals in other professions. Self-report questionnaires were used in the current study, while other tools such as observation, interviewing, etc. could reflect a clearer image of reality. It is recommended that managers of stressful occupations use the findings of the present study and the neurosis scales periodically to evaluate employees and announce the outcomes to prevent the factors influential in this disorder. The investigation of practical applications of personal and psychological empowerment in stressful occupations and PTSD among firefighters is recommended for future studies in order to provide practical solutions for relevant authorities and organizations.

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## Conflict of Interests

Authors have no conflict of interests.

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