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SYMPTOMS OF POST-TRAUMATIC STRESS DISORDER (PTSD) IN FIREFIGHTERS: THE ROLE OF RESILIENCE AND LOCUS OF CONTROL

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Abstract

Introduction: The fire-fighting service is a high-risk profession that exposes individuals to frequent traumatic events, which can adversely affect mental health and contribute to the development of PTSD. Research on the psychological impact of trauma among firefighters is limited. This study aims to examine the role of resilience and locus of control as predictors of PTSD symptoms among 86 professional firefighters in Tirana. The study seeks to explore the relationship between resilience, workplace locus of control, and symptoms of post-traumatic stress disorder (PTSD) among Albanian firefighters.
Methodology: This study aims to determine whether resilience and locus of control in the workplace can predict the severity of PTSD symptoms within a high-risk professional group, such as firefighters. The study was conducted as quantitative research. Participants in the study were 86 professional firefighters. The applied instruments were the Resilience Scale (RS-14) (Wagnild & Young, 1993), the Work Locus of Control Scale (WLCS) (Spector, 1988), and the Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5) (Weathers, Litz, Herman, Huska & Keane, 1993). A multiple regression analysis using MANOVA was performed to examine the relationships between resilience, locus of control, and PTSD symptoms, identifying the influence of these factors on the development of post-traumatic stress disorder in firefighters.
Results: The findings revealed that resilience was a significant negative predictor of PTSD symptoms, indicating that firefighters with higher resilience levels reported fewer PTSD symptoms. In contrast, an external locus of control at work positively predicted PTSD symptoms, meaning that firefighters who believed they had less control over their work environment experienced higher trauma-related stress.
Recommendations: The findings highlight the importance of programs and interventions aimed at building resilience and reducing external control beliefs in the workplace to better support the mental health of firefighters. The development of targeted interventions focusing on enhancing resilience and adjusting perceptions of locus of control could serve as a protective factor against PTSD in high-risk professions.

Keywords: fire-fighters, resilience, locus of control, post-traumatic stress disorder, well-being.

1. Introduction

Traumatic events and post-traumatic stress disorder (PTSD) are becoming global concerns, particularly for frontline workers such as firefighters. Studies indicate that approximately 80% of firefighters experience repeated trauma throughout their careers, often more than 11 times (Carleton et al., 2019). Continuous exposure to accidents, natural disasters, and severe injuries significantly increases the risk of PTSD (Sahebi et al., 2020). Other research suggests that around 20% of firefighters develop work-related PTSD, which negatively impacts their concentration, sleep, and effectiveness in emergency situations (Noor et al., 2019; Skorgstad et al., 2013).

Various factors contribute to the development of PTSD, including biological predispositions, family psychiatric history, past traumas, and social support (Ozer et al., 2008). Meanwhile, protective factors such as resilience and social relationships can help reduce this risk (Agaibi & Wilson, 2005; Dworkin et al., 2018). Research further suggests that locus of control plays a crucial role: individuals with an internal locus of control, who believe they have influence over

their circumstances, report lower PTSD symptoms, whereas those with an external locus of control experience more pronounced symptoms (Meyer et al., 2012).
Considering the unique challenges faced by firefighters, this study aims to examine the role of resilience and locus of control in predicting PTSD symptoms within this population. A deeper understanding of these factors may contribute to the development of early interventions that support mental well-being and enhance the psychological resilience of firefighters (Kearns et al., 2012).
Emergency responders, including firefighters, police officers, medical teams, and rescue workers, encounter critical incidents daily that impact their psychological well-being (Benedek et al., 2007). Although exposure to such situations has a profound emotional impact, the focus has historically been more on physical health rather than psychological well-being (Jang et al., 2016).
One of the primary mental health concerns in these professions is post-traumatic stress disorder (PTSD), which has increasingly been recognized as a widespread occupational risk (Herold et al., 2016; Nydegger et al., 2011). Raising awareness and implementing appropriate support strategies can help improve the psychological well-being of these professionals.
The literature on PTSD among firefighters identifies three key themes: trauma exposure, PTSD prevalence, and supportive approaches (Cramm et al., 2021). Factors such as pre-existing mental health issues and lack of social support increase the risk of PTSD, whereas preventive strategies include a healthy organizational environment, regular training, and self-care following critical incidents (Skogstad et al., 2013).
Studies confirm the link between PTSD and rescue workers, highlighting the need for targeted interventions. However, further research is necessary to gain a deeper understanding of this relationship (Van Eerd et al., 2021).
Resilience refers to the capacity of a dynamic system to successfully adapt to disturbances that threaten its longevity, function, or development (Masten, 2014). Shifting the focus from trauma and its negative effects to examining resilience reflects a broader desire to acknowledge that trauma does not solely result in pathology.
Discussions on resilience emphasize that trauma does not exclusively lead to negative consequences but can also create opportunities for growth and positive adaptation. Yehuda et al. (2007) argue that resilience and PTSD can coexist, challenging the notion that trauma survivors are simply divided into those who exhibit PTSD symptoms and those who are resilient. The key distinction lies between "resistance" (the absence of symptoms) and "recovery" (overcoming symptoms after experiencing them).
Resilience is a crucial protective factor for firefighters, who frequently and continuously face exposure to hazardous situations (Jeong et al., 2015). Resilient firefighters can adapt to complex challenges and maintain their ability to respond effectively to dynamic events (Ogińska-Bulik et al., 2016). Ensuring stable levels of resilience is essential for safeguarding their well-being and productivity, as well as for reducing occupational injuries (Laal et al., 2017).
Resilience helps mitigate the effects of trauma and stress, particularly in high-risk professions (Carli et al., 2011). Studies indicate that genetic factors and early-life experiences can influence vulnerability to depressive symptoms and PTSD (Rothbaum et al., 2014). Additionally, resilience serves as a significant moderator in the relationship between trauma exposure and the development of mental health issues among firefighters (Kim et al., 2017).
A systematic review of proactive psychological programs suggests that these interventions play a key role in preventing post-traumatic stress-related harm and promoting the psychological well-being of at-risk professionals (Serrano-Ibáñez et al., 2023).
Research indicates that locus of control (LOC) and resilience play a crucial role in firefighters' well-being, particularly in high-stress environments (Serrano-Ibáñez et al., 2023; Eryılmaz et al., 2024). LOC directly influences mental health and stress responses in the workplace, making

it a critical factor in managing the well-being of firefighters and other high-risk professionals (Schäfer et al., 2020).
Individuals with an external LOC are more susceptible to developing PTSD, whereas an internal LOC serves as a protective factor against post-traumatic stress (Jakšić et al., 2012). Moreover, personality traits influence this relationship, with neuroticism being associated with increased PTSD symptoms and extraversion linked to their reduction (Jahnke et al., 2014).
The impact of LOC extends beyond PTSD, affecting stress perception and cardiovascular health (Böttche et al., 2016). Additionally, in chronic pain treatment, individuals with an internal LOC experience better outcome in rehabilitative therapies (Ayed, Toner, & Priebe, 2019). These findings suggest that LOC should be integrated into mental health interventions and stress management strategies for professionals working in challenging environments.
In conclusion, traumatic events and post-traumatic stress disorder (PTSD) are growing concerns, particularly for frontline workers such as firefighters, who face repeated trauma throughout their careers. Factors such as resilience and locus of control play a crucial role in predicting the development of PTSD symptoms, contributing to psychological support and stress management. Studies indicate that individuals with an internal locus of control exhibit fewer PTSD symptoms, whereas those with an external locus of control are more susceptible to developing the disorder. Resilience and locus of control are essential for promoting well-being and mitigating the effects of trauma among firefighters, highlighting the need for targeted interventions and support focused on these protective factors.

2. Materials and methods

This study employs a quantitative research design to explore the relationship between resilience, locus of control in the workplace, and symptoms of post-traumatic stress disorder (PTSD) among Albanian firefighters. Specifically, the study aims to determine whether resilience and workplace locus of control can predict the severity of PTSD symptoms in this high-risk professional group. By investigating these psychological factors, the study seeks to identify potential protective factors that may inform interventions aimed at reducing PTSD symptoms and improving the mental health of firefighters.

Research questions

The research questions for the study are as follows:

- How does the level of resilience describe the severity of PTSD symptoms among Albanian firefighters?
- What is the relationship between locus of control in the workplace and PTSD symptoms among Albanian firefighters?
- Can resilience and workplace locus of control predict the severity of PTSD symptoms among Albanian firefighters?

Study hypotheses

The hypotheses for the study are:
Hypothesis 1: A higher level of resilience will be negatively associated with the severity of PTSD symptoms among Albanian firefighters.
Hypothesis 2: A high external locus of control will be positively associated with the severity of PTSD symptoms among Albanian firefighters.
Hypothesis 3: Resilience and workplace locus of control will jointly predict the severity of

PTSD symptoms among Albanian firefighters.

*2.1 Participants and Sampling:*In this study, the participants (n=86) were firefighters from the Fire Protection and Rescue Directorate (DMZSH), Sector No. 1 "21 Dhjetori," Municipality of Tirana. The sample selection was conducted using a **convenience sampling** method, meaning participants were chosen from a specific group that was easily accessible to the researcher, and they agreed to participate after providing informed consent. The study questionnaire was distributed in a **hardcopy** format to each firefighter.

Of the total participants, 100% (n=86) were male. Regarding age, the average age of the participants was **M=31-40 years** (Standard Deviation = 1.047). The minimum age group was **20-30 years**, while the maximum age group was **61-70 years**, with an age range of **R=5** years. For more detailed information about the age distribution, please refer to Table 1.

Table 1: Demographic Information

Variable	**N (%)**
Gender	
Female	0 (0%)
Male	86 (100%)
Age	
20-30	8 (9.3%)
31-40	45 (52.3%)
41-50	15 (17.4%)
51-60	13 (15.1%)
61-70	5 (5.8%)

2.2 Data collection: To gather the necessary data for this study, questionnaires were used, which were administered in hardcopy format. Sector No. 1 of the fire service was visited to request permission from the responsible commissioner, who communicated with the other operational firefighters. The purpose of the research was explained to the participants, confidentiality and anonymity of the data were assured, and they were also informed of the possibility to withdraw from participation at any time during the completion of the questionnaire.

The data collection process was conducted by a third party (based on an intermediary), with the commissioner of this directorate being responsible for the distribution and collection of completed questionnaires from the firefighters at the station. His involvement helped manage the distribution and improved the data collection process, ensuring significant firefighter participation.

For processing the data collected from the questionnaires and generating results, IBM SPSS Statistics 25 software was used.

2.3 Study instruments: In this study, three widely recognized and commonly used assessment instruments were employed: the Resilience Scale (RS-14) (Wagnild & Young, 1993), the Work Locus of Control Scale (WLCS) (Spector, 1988), and the Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5) (Weathers, Litz, Herman, Huska, & Keane, 1993).

The first questionnaire administered was the **Resilience Scale (RS-14)**. RS-14 is a self-report assessment tool with 14 items, a shortened version of the **Resilience Scale (RS-25)** (Wagnild

& Young, 1993), specifically designed to identify and measure an individual's capacity to cope with traumatic experiences and manage how they function in response to life's stressors. It has been widely used to assess resilience for both clinical and research purposes. In the current study, the reliability coefficient for RS-14 was good (Cronbach's α = 0.826) (see Table 2).
The second questionnaire administered was the **Work Locus of Control Scale (WLCS)**. WLCS is an instrument consisting of 16 items used to assess the extent to which individuals perceive control over their work environment (Spector, 1988). In the current study, the reliability coefficient for WLCS was also good (Cronbach's α = 0.827).
The third questionnaire administered was the **Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5)**. The PTSD Checklist (PCL; Weathers et al., 1993; Weathers et al., 2013) is a self-report scale for assessing PTSD symptoms. PCL-5 has been used not only to evaluate and determine the severity of symptoms but also to monitor changes in symptoms over time and in response to interventions (Weathers et al., 1993; Weathers et al., 2013).
In the current study, the reliability coefficient was excellent (Cronbach's α = 0.954). In summary, Table 3 demonstrates Cronbach's alpha for all three questionnaires.

Table 2: Reliability of Measuring Scales

Scale	Cronbach's Alpha	Number of Items
The Resilience Scale (RS-14)	.826	14
The Work Locus of Control Scale (WLCS)	.827	16
Posttraumatic Stress Disorder Checklist for DSM-5	.954	20

2.4 Data analysis: During the data analysis process, data cleaning was conducted, which allowed for the identification and elimination of any errors arising from unclear responses, missing data, and other related mistakes. The data collected from the questionnaires were initially coded in the "Excel" program to facilitate statistical analysis. Following this, the data were analyzed using the Statistical Package for the Social Sciences (SPSS for Windows, Version 25). Additionally, Pearson's correlation and multiple regression analyses were performed to test the hypotheses in this study.

2.5 *Ethical Considerations*: This study adhered to ethical principles, as outlined below:

- Ensuring informed consent from participants, who were informed about the purpose and methodology of the study and agreed to participate voluntarily.
- Firefighters who participated in this study were made aware that the data collected would be used solely for research purposes, and the principles of anonymity and confidentiality would be fully respected, with no personal identifiers included in their responses.
- Participants were informed that the study had no dual intentions, and the results were solely for the purpose of the study.

2.6 Limitations of the Study: The study has several important limitations that impact the interpretation of the findings. The small sample size may limit the generalizability of the results to the broader population, and the lack of gender diversity, especially the absence of female participants, makes it more difficult to fully represent PTSD symptoms. Even the geographical inclusion of employees would have provided a more comprehensive view. Certain variables, such as social support, may have an effect on the interpretation of the results, which influences the findings. Additionally, the accuracy of the instruments used to measure symptoms and the

impact of cultural and contextual factors may present challenges when comparing the results with other studies.

Results and discussion

Data analysis for this study was conducted using IBM SPSS 25.0 for Windows. Initially, the data were assessed for normality, consistency, and homogeneity to ensure their appropriateness for the correlation and regression analyses. The values of variables such as resilience, work locus of control, and PTSD symptoms fell within acceptable limits. Therefore, it was confirmed that the data from the firefighter sample exhibited a normal distribution, making them suitable for further analysis.

3.1 Description of the Sample: This study included 86 firefighters from the Tirana district, with ages ranging from 20 to 70 years. For the ease of data processing, participants (n=86) were divided into five age groups: 20-30, 31-40, 41-50, 51-60, and 61-70 years. The sample was selected using a convenience sampling method, and the questionnaire was distributed in physical (paper) format to each firefighter. All participants (100%, n=86) were male. Regarding age, the most represented age group was 31-40 years (M=31-40, SD=1.047). The minimum age group was 20-30 years, and the maximum age group was 61-70 years (Range=5). (See Table 4).

Table 3: Age Distribution

Age Range	**Frequency**	**Percentage**	**Cumulative %**
20-30	8	9.3%	9.3%
31-40	45	52.3%	61.6%
41-50	15	17.4%	79.1%
51-60	13	15.1%	94.2%
61-70	5	5.8%	100.0%
Total	86	100.0%	

Training experiences

The training experiences of the firefighter sample demonstrate a broad range of qualifications, with various types of training completed. A significant majority, 60.5% (n=52), reported having completed basic firefighter training, which forms the foundational skill set required for effective fire suppression. 20.9% (n=18) underwent basic-level training specifically designed for firefighters, ensuring that they possess the necessary competencies for responding to emergencies.

Some firefighters engaged in specialized training programs, with 8.1% (n=7) indicating that they had completed certifications such as CBRN (Chemical, Biological, Radiological, and Nuclear protection) and training for automobile accidents. Additionally, other areas of advanced training included rescue operations, tactical fire suppression, and evacuation procedures, reflecting the firefighters' preparedness for a range of emergency situations. Broader training experiences were reported, with 6.3% (n=5) participating in professional training both domestically and internationally, emphasizing their exposure to various methodologies and practices in fire suppression. Data also revealed that 1.2% had received specialized training in

specific areas, such as hazardous materials, emergency medical assistance, and urban search-and-rescue.

Years of Experience

The percentage of firefighters who reported having 1-5 years of service was 15.1%, indicating a small portion of relatively new personnel. Meanwhile, 40.7% reported having served 6-10 years, suggesting a significant number with moderate experience. 31.4% of participants fall into the 11-20 years of service category, highlighting the presence of well-trained professionals. Only 5 firefighters (5.8%) reported having 21-30 years of service, and 6 firefighters (7.0%) had served for 31-40 years. Overall, these results indicate that the majority of firefighters in this study have 6-20 years of experience.

Table 4: Distribution of Years of Experience

Years of Experience	**Frequency**	**Percentage**	**Cumulative Percentage**
1-5	13	15.1%	15.1%
6-10	35	40.7%	55.8%
11-20	27	31.4%	87.2%
21-30	5	5.8%	93.0%
31-40	6	7.0%	100.0%
Total	**86**	**100.0%**	

Table 5: Correlations

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Age	1.00	.100	.788**	.121	.067	.011	-.115
2. Firefighter Position	.100	1.00	.202	.137	.177	-.169	-.145
3. Years of Experience	.788**	.202	1.00	.156	.037	-.015	-.089
4. Education	.121	.137	.156	1.00	.145	-.347**	-.192
5. Resilience	.067	.177	.037	.145	1.00	-.548**	-.450**
6. Locus of Control	.011	-.115	-.169	-.145	-.015	1.00	.459**
7. PTSD Symptoms	-.115	-.145	-.089	-.192	-.450**	.459**	1.00

Note:

- represents no significant correlation.
- Correlation coefficients with **** indicate statistical significance at **p < .01** level

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Job Security and Job Satisfaction

Descriptive statistics from the study provide valuable insights into the firefighters' experiences. When evaluating the safety and condition of their firefighting equipment, participants rated it positively, with an average score of 7.53 (SD = 1.65) on a scale from 1 to 10. Regarding job satisfaction, firefighters expressed a high level of satisfaction, rating their current work environment with an average of 7.99 (SD = 1.64) on the same scale. However, the spread of ratings (standard deviation and range) indicates that there are some individuals who perceive their work conditions as either significantly lower or higher than the average.

Table 6: Job Security and Job Satisfaction Qualities

Quality	Job Security	Job Satisfaction
Mean	7.53	7.99
Median	8.00	8.00
Mode	8	8
Standard Deviation	1.532	1.641
Variance	2.346	2.694
Range	8	9
Maximum	10	10

3.2 Correlations between variables: The correlation analysis was conducted using Pearson's correlation coefficient (r), revealing several significant relationships between demographic and psychological variables. Age shows a strong positive correlation with Years of Service ($r = 0.788$, $p < 0.01$), indicating that older firefighters tend to have more years of experience. Additionally, age is positively correlated with organizational atmosphere ($r = 0.264$, $p < 0.05$), suggesting that older individuals perceive the work environment more positively, although this relationship is not very strong. On the other hand, education level is negatively correlated with locus of control ($r = -0.347$, $p < 0.01$), implying that higher education is associated with a stronger internal locus of control. The perceived level of job security is positively correlated with job satisfaction and organizational atmosphere ($r = 0.648$, $p < 0.01$), indicating that firefighters who feel more secure in their jobs report greater satisfaction with their work environment.

However, job security has a negative correlation with PTSD symptoms ($r = -0.291$, $p < 0.01$), meaning that those who perceive higher job security report fewer PTSD symptoms. A noticeable relationship was found between resilience and organizational atmosphere ($r = 0.288$, $p < 0.01$) as well as job satisfaction ($r = 0.256$, $p < 0.05$), suggesting that higher resilience is linked to a more positive perception of the work environment. Resilience also has strong negative correlations with locus of control ($r = -0.548$, $p < 0.01$) and PTSD symptoms ($r = -0.450$, $p < 0.01$), indicating that firefighters with higher resilience tend to have a more internal locus of control and report fewer PTSD symptoms. Furthermore, locus of control is positively correlated with PTSD symptoms ($r = 0.459$, $p < 0.01$), showing that those with a higher external locus of control are more likely to experience severe PTSD symptoms. These relationships highlight the complex dynamics between demographic factors, resilience, job security perceptions, and the prevalence of PTSD symptoms among firefighters.

3.3 The Effect of Resilience on PTSD Symptoms:

Table 7: Correlation between Internal and External Locus of Control and Total PTSD Scores

Variables	Internal LOC	External LOC	PTSD Symptoms
Internal LOC	1	-0.033	0.315**
External LOC	-0.033	1	0.411**
PTSD Symptoms	0.315**	0.411**	1

Note: N=86 $p<0.01^{**}$ (2-tailed)

The correlation analysis reveals a significant negative relationship between resilience (Total_Rez) and PTSD symptoms (Total_PCL) among firefighters. The Pearson correlation coefficient between resilience (Total_Rez) and the total PTSD symptom score (Total_PCL) is -0.450, which is statistically significant at the ($p < 0.001$) level. This reflects a moderate negative correlation between resilience and overall PTSD symptoms, where higher resilience is associated with lower severity of PTSD symptoms.

This negative correlation is also observed in specific PTSD symptom clusters, including re-experiencing the traumatic event (-0.441), avoidance of trauma-related cues (-0.460), negative changes in cognition and mood (-0.474), and hyperarousal/reactivity related to the trauma (-0.392), all of which are statistically significant ($p < 0.001$).

The strongest relationship is between resilience and changes in cognition and mood, suggesting that resilience may help alleviate negative emotional and cognitive responses to trauma.

All PTSD symptom clusters are also correlated with one another, with correlation values ranging from 0.868 to 0.970. This indicates that these PTSD symptoms are closely related and tend to be experienced together in individuals with PTSD.

Additionally, resilience is negatively correlated with the PTSD diagnosis ($r = -0.519$; $p < 0.01$), meaning that higher resilience is associated with a lower likelihood of receiving a PTSD diagnosis. The total PTSD symptoms (Total_PCL) are strongly correlated with the PTSD diagnosis ($r = 0.974$; $p < 0.01$), as expected, since the total score is likely to determine the diagnosis.

3.4 External Locus of Control and PTSD Symptoms: There is a statistically significant positive correlation between the internal locus of control and the total sum of PTSD scores, with a correlation coefficient ($r = 0.315$); ($p = 0.003$). This indicates that higher levels of internal locus of control are associated with increased severity of PTSD symptoms.

Meanwhile, between the external locus of control and the total sum of PTSD scores, there is an even stronger correlation with ($r = 0.411$); ($p < 0.001$), suggesting that a higher external locus of control is associated with greater severity of PTSD symptoms. Furthermore, there is no significant correlation between the internal and external locus of control ($r = -0.033$) ($p = 0.762$).

Regression analysis reveals a moderate positive relationship between the predictor variables (locus of control and resilience) and the outcome (PTSD), with a correlation coefficient $r = 0.517$. This suggests that as the predictors increase, the severity of PTSD symptoms tends to rise.

Approximately 26.8% of the variance in PTSD is explained by the predictors, as indicated by the R^2 value, while 73.2% remains unexplained, suggesting the potential influence of other factors on PTSD symptoms. The adjusted R^2 of 0.250 confirms that the model retains similar explanatory power when accounting for the number of predictors. The standard error of the estimate is 16.40036, indicating a reasonable fit between the observed and predicted values.

However, the Durbin-Watson statistic of 1.416 raises concerns about the independence of the residuals and the overall validity of the regression results (Table 8).

Table 8: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics	Durbin-Watson
1	0.517	0.268	0.250	16.40036	R^2 Change: 0.268	1.416
					F Change: 15.158	
					df1 = 2, df2 = 83	
					Sig. F Change: 0.000	

 Dependent **variable**: PTSD symptoms (simp. PTSD)
 Independent **variables**: Locus of control, resilience

The MANOVA results reveal significant insights into the effectiveness of the regression model in predicting PTSD symptoms. The regression sum of squares is 8154.316, indicating that this amount of variance is explained by the model, while the residual sum of squares is 22324.672, representing the unexplained variance. The F-statistic is 15.158, suggesting that the model significantly improves our understanding of PTSD symptoms compared to a model without predictors. The p-value is 0.000, indicating high statistical significance and allowing the rejection of the null hypothesis, confirming that at least one predictor (locus of control or resilience) contributes significantly to predicting PTSD (Table 9).

Table 9: ANOVA Regression Total PTSD symptoms

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8154.316	2	4077.158	15.158	0.000
Residual	22324.672	83	268.972		
Total	30478.988	85			

- **Dependent variable**: PTSD symptoms (simp. PTSD)
- **Independent variables**: Locus of control, resilience

The coefficients from the regression analysis provide key insights into the predictors of PTSD symptoms. The constant term is 57.338 (p = 0.046), indicating the expected value of PTSD when both predictors are zero, and this value is statistically significant.
The coefficient for resilience is -0.686 (p = 0.013), suggesting that as resilience increases by one unit, PTSD symptoms decrease by 0.686 units. This indicates a statistically significant negative relationship where higher resilience is associated with fewer PTSD symptoms. Meanwhile, the coefficient for locus of control is 0.549 (p = 0.008), indicating that a one-unit increase in this predictor leads to an increase of 0.549 units in PTSD symptoms.
Referring to the data gathered in this study, in which the role of resilience and locus of control as predictive factors for PTSD was examined, the results show that firefighters with higher levels of resilience display fewer symptoms of post-traumatic stress disorder (PTSD), and resilience had a negative correlation with PTSD in Albanian firefighters. This hypothesis is supported by several empirical studies, which highlight the protective role of resilience in reducing the severity of PTSD symptoms, especially in emergency professions exposed to ongoing trauma, such as firefighters. Resilience is described as a dynamic capacity that enables individuals to positively adapt to stressful events and recover from trauma through a sustained emotional and cognitive process (Masten, 2014).
The hypothesis that "higher levels of resilience will negatively correlate with the severity of PTSD symptoms in firefighters" is supported by research, despite not aligning with findings in

South Africa (Connell, 2013). However, this study used a small sample drawn from an online survey, which may have influenced the sampling base. Various studies, such as those by Lee et al. (2014), Cramm et al. (2021), Benotsch et al. (2000), and Meyer et al. (2012), confirm that resilience acts as a protective factor, helping individuals manage the impacts of traumatic events and reducing the severity of PTSD symptoms. Interventions aimed at improving resilience should be considered as part of strategies to enhance psychological well-being and reduce the prevalence of PTSD in high-risk groups such as firefighters.

Regarding the variable of locus of control, the expectation that a higher external locus of control would positively correlate with the severity of PTSD symptoms in firefighters, this hypothesis argues that firefighters with a high external locus of control tend to display more severe PTSD symptoms. This negative relationship between resilience and PTSD symptoms was confirmed even for specific symptom groups, such as re-experiencing the traumatic event, avoidance of trauma-related cues, and negative changes in cognition and mood, all with statistical significance.

These findings suggest that an external locus of control is a factor that directly impacts the worsening of PTSD symptoms. While studies have emphasized that an internal locus of control helps individuals manage stress more effectively and use adaptive coping strategies, an external locus tends to promote perceptions of negativity and feelings of helplessness. Therefore, interventions aimed at improving firefighters' locus of control and shifting it toward a more internal one may be beneficial in reducing PTSD symptoms and enhancing their psychological well-being (Meyer et al., 2012).

Therefore, reducing the external locus of control and promoting an internal locus of control through specialized training and psychological interventions is essential for the well-being of firefighters.

Regarding the hypothesis of the impact of resilience and locus of control in the workplace on PTSD symptoms, we can say that resilience and locus of control in the work environment predict the severity of PTSD symptoms in firefighters. This hypothesis is widely supported by existing literature, which suggests that both factors significantly influence stress management and coping with the difficult situations that characterize this profession. Resilience, defined as the ability to adapt and recover to a previous state after a traumatic experience, and locus of control, which defines individuals' beliefs about the extent of control they have over the events in their lives, have a significant impact on post-traumatic stress experiences (Masten, 2014).

The model explains 26.8% of the variance in PTSD symptoms, highlighting the importance of these psychological factors in understanding PTSD. Specifically, an increase in resilience is associated with lower PTSD symptoms, while higher results in the predictor of locus of control are linked to greater symptom severity. However, the model's fit is somewhat limited by significant unexplained variance, suggesting that other variables may also have an impact. Therefore, further studies are needed.

Lee et al. (2014), in their study of firefighters in South Korea, found that the interaction between resilience and locus of control significantly impacted the reduction of PTSD symptoms. Firefighters with high levels of resilience and internal locus of control exhibited lower levels of PTSD symptoms, while those with an external locus of control experienced more severe symptoms. This study suggests that interventions aimed at increasing the internal locus of control and improving resilience are crucial for protecting firefighters' well-being. Similarly, Setti & Argentero (2016), in a study on Israeli soldiers, confirmed that internal locus of control and resilience are key factors for reducing PTSD symptoms and increasing the capacity to cope with trauma.

In conclusion, the model presented in the study provides valuable insights into the psychological factors that influence the severity of PTSD symptoms, specifically focusing on resilience and locus of control. The findings suggest that higher levels of resilience are associated with lower

PTSD symptom severity, while an external locus of control contributes to increased symptom intensity. These results highlight the importance of fostering resilience and promoting an internal locus of control to mitigate the effects of PTSD in high-risk professions like firefighting.

However, the model's ability to explain PTSD symptoms is somewhat limited due to unexplained variance, suggesting that other variables might contribute to the development and severity of PTSD. This indicates the need for further research to explore additional factors, such as social support, previous trauma experiences, and coping mechanisms, that could influence PTSD outcomes. Overall, these results provide a foundation for developing targeted interventions for individuals in high-stress occupations to promote better mental health and well-being.

Conclusions and recommendations

This study marks the first attempt to assess PTSD symptoms among firefighters and has contributed to the existing literature on the impact of resilience and locus of control on PTSD symptoms in the firefighting personnel context in Albania. Since resilience and locus of control in the work environment were found to be negatively associated with the severity of PTSD symptoms, it is important to consider these factors when preparing firefighters for disaster response tasks.

The results showed that higher levels of resilience and internal locus of control positively influence firefighters' ability to cope with stressful situations and reduce PTSD symptoms. Both were identified as key protective factors against the development of PTSD symptoms, suggesting that firefighters with these traits are more likely to maintain better mental health.

These findings highlight the importance of psychological factors in managing PTSD and the well-being of employees, suggesting that the role of psychologists should be present and active during firefighters' work to address the specific needs that arise from their stressful experiences.

It is recommended that future studies examine other mediating factors, such as social support and family systems, and conduct longitudinal studies to assess the long-term effects of PTSD development and the role of resilience and locus of control.

Although this study provides a starting point for exploring the relationship between resilience, locus of control, and the severity of PTSD symptoms, it is important for future researchers to use more diverse and representative samples in terms of gender, protective mechanisms, and social support. Furthermore, the lack of significant relationships between education and PTSD symptoms contradicts existing literature, suggesting that other contextual factors, such as social support and previous traumatic experiences, may play a larger role.

In general, this study underscores the importance of understanding the unique challenges faced by firefighters and calls for further research on the complexity of PTSD in high-stress professions. For researchers interested in this topic, it is recommended to use additional data beyond self-reported measures and consider data on previous trauma experiences to offer a deeper understanding.

References

[1]. Agaibi C. E., & Wilson J. P. (2005). Trauma, PTSD, and resilience: A review of the literature. *Trauma, Violence & Abuse*, 6 (3), 195–216.

[2]. Ayed, N., Toner, S., & Priebe, S. (2019). Conceptualizing resilience in adult mental health literature: A systematic review and narrative synthesis. *Psychology and psychotherapy*, 92(3), 299–341. https://doi.org/10.1111/papt.12185

[3]. Benedek, D. M., Fullerton, C., & Ursano, R. J. (2007). First responders: Mental health consequences of natural and human-made disasters for public health and public safety workers. *Annual Review of Public Health*, 28, 55–68. doi:10.1146/annurev.publhealth.28. 021406.144037
[4]. Böttche, M., Kuwert, P., Pietrzak, R. H., & Knaevelsrud, C. (2016). Predictors of outcome of an Internet-based cognitive-behavioural therapy for post-traumatic stress disorder in older adults. *Psychology and Psychotherapy*: *Theory, Research and Practice*, 89(1), 82–96. doi:10.1111/papt.12069
[5]. Carleton, R. N., Afifi, T. O., Taillieu, T., Turner, S., Krakauer, R., Anderson, G. S., & McCreary, D. R. (2019). Exposures to potentially traumatic events among public safety personnel in Canada. *Canadian Journal of Behavioural Science*/Revue canadienne des sciences du comportement, 51(1), 37.
[6]. Carli, V., Mandelli, L., Zaninotto, L., Roy, A., Recchia, L., Stoppia, L., Gatta, V., Sarchiapone, M., & Serretti, A. (2011). A protective genetic variant for adverse environments? The role of childhood traumas and serotonin transporter gene on resilience and depressive severity in a high-risk population. European psychiatry : *Journal of the Association of European Psychiatrists*, 26(8), 471–478. https://doi.org/10.1016/j.eurpsy.2011.04.008
[7]. Cramm, H., Tam-Seto, L., Mahar, A.L., Rühland, L., & Carleton, R.N. (2021). Firefighters and Posttraumatic Stress Disorder. Handbook of Posttraumatic Stress, Wiley Press.
[8]. Dworkin E. R., Ojalehto H., Bedard-Gilligan M. A., Cadigan J. M., Kaysen D. (2018). Social support predicts reductions in PTSD symptoms when substances are not used to cope: A longitudinal study of sexual assault survivors. *Journal of Affective Disorders*, 229, 135–140. 10.1016/j.jad.2017.12.042
[9]. Eryılmaz, İ., Dirik, D. & Öney, T. (2024). A phenomenological study on psychological resilience of aircraft rescue and fire fighting professionals. Curr Psychol 43, 20286–20308 https://doi.org/10.1007/s12144-024-05862-4
[10]. Herold, B., Stanley, A., Oltrogge, K., Alberto, T., Shackelford, P., Hunter, E., & Hughes, J. (2016). Post-traumatic stress disorder, sensory integration, and aquatic therapy: A scoping review. *Occupational Therapy in Mental Health*, 32(4), 392–399. doi:10.1080/0164212x.2016.1166355
[11]. Jahnnke, S. A., Gist, R., Poston, W. S. C., & Haddock, C. K. (2014). Behavioral health interventions in the fire service: Stories from the firehouse. *Journal of Workplace Behavioural Health*, 29(2), 113–126. doi:10.1080/15555240.2014.898568
[12]. Jang, S., Ryu, H., Choi, S., & Lee, S. (2016). Psychological factors influence the gastroesopha- geal reflux disease (GERD) and their effect on quality of life among firefighters in South Korea. *International Journal of Occupational and Environmental Health*, 22(4), 315–320. doi:10.1080/10773525.2016.1235675
[13]. Jeong, H. S., Kang, I., Namgung, E., Im, J. J., Jeon, Y., Son, J., Yu, S., Kim, S., Yoon, S., Lyoo, I. K., Chung, Y. A., Lim, J. H., & Kim, J. E. (2015). Validation of the Korean version of the Connor-Davidson Resilience Scale-2 in firefighters and rescue workers. *Comprehensive psychiatry*, 59, 123–128. https://doi.org/10.1016/j.comppsych.2015.01.00
[14]. Kearns M.C., Ressler K.J., Zatzick D., Rothbaum B.O. (2012). Early interventions for PTSD: A review. *Depression and Anxiety*, 29(10), 833–842. 10.1002/da.21997
[15]. Kim, J. I., Park, H., & Kim, J. H. (2018). The mediation effect of PTSD, perceived job stress and resilience on the relationship between trauma exposure and the development of depression and alcohol use problems in Korean firefighters: A cross-sectional study. *Journal of affective disorders*, 229, 450–455. https://doi.org/10.1016/j.jad.2017.12.055
[16]. Laal F, Jafari MJ, Noorizadeh N, et al. (2017). Mental workload and affecting factors among firefighters in Tehran, Iran, in 2017. *JOHE*, 6(4):184–189.
[17]. Lee, Jong-Sun; Ahn, Yeon-Soon; Jeong, Kyoung-Sook; Chae, Jeong-Ho; Choi, Kyeong-Sook . (2014). Resilience buffers the impact of traumatic events on the development of PTSD symptoms in firefighters. *Journal of Affective Disorders*, 162(), 128–133. doi:10.1016/j.jad.2014.02.031
[18]. Masten, A. S. (2014). Global perspectives on resilience in children and youth. *Child Development*, 85(1), 6–20. https://doi.org/10.1111/cdev.12205
[19]. Meyer, E. C., Zimering, R., Daly, E., Knight, J., Kamholz, B. W., & Gulliver, S. B. (2012). Predictors of posttraumatic stress disorder and other psychological symptoms in trauma-exposed firefighters. *Psychological services*, 9(1), 1–15. https://doi.org/10.1037/a0026414
[20]. Noor N., Pao C., Dragomir-Davis M., Tran J., Arbona C. (2019). PTSD symptoms and suicidal ideation in US female firefighters. *Occupational Medicine*, 69(8–9), 577–585. 10.1093/occmed/kqz057

[21]. Nydegger, R., Nydegger, L., & Basile, F. (2011). Post-traumatic stress disorder and coping among career professional firefighters. *American Journal of Health Sciences*, 2(1), 11–20. doi:10.19030/ajhs.v2i1.4365
[22]. Ogińska-Bulik N, Kobylarczyk M. (2016). Association between resiliency and posttraumatic growth in firefighters: the role of stress appraisal. Int J Occup Saf Ergon, 22(1):40–8.
[23]. Ozer E. J., Best S. R., Lipsey T. L., Weiss D. S. (2008). Predictors of post-traumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Trauma: Theory, Research, Practice, and Policy*, 129(1), 3–36.
[24]. Rothbaum, B. O., Kearns, M. C., Reiser, E., Davis, J. S., Kerley, K. A., Rothbaum, A. O., Mercer, K. B., Price, M., Houry, D., & Ressler, K. J. (2014). Early intervention following trauma may mitigate genetic risk for PTSD in civilians: a pilot prospective emergency department study. *Journal of clinical psychiatry*, 75(12), 1380–1387. https://doi.org/10.4088/JCP.13m08715
[25]. Sahebi, A., Yousefi, K., Moayedi, S., Golitaleb, N., Esmaeili Vardanjani, A., & Golitaleb, M. (2020). Prevalence of Posttraumatic Stress Disorder among Firefighters in Iran: A Systematic Review and Meta-Analysis. *Iranian journal of psychiatry*, 15(4), 358–365. https://doi.org/10.18502/ijps.v15i4.4301
[26]. Schäfer, S. K., Sopp, M. R., Staginnus, M., Lass-Hennemann, J., & Michael, T. (2020). Correlates of mental health in occupations at risk for traumatization: a cross-sectional study. *BMC psychiatry*, 20(1), 335. https://doi.org/10.1186/s12888-020-02704-y
[27]. Serrano-Ibáñez, E. R., Corrás, T., Del Prado, M., Diz, J., & Varela, C. (2023). Psychological Variables Associated With Post-Traumatic Stress Disorder in Firefighters: A Systematic Review. *Trauma, violence & abuse*, 24(4), 2049–2066. https://doi.org/10.1177/15248380221082944
[28]. Setti, I., Argentero, P. (2016). Traumatization and PTSD in Rescue Workers: Prevention, Assessment, and Interventions. In: Martin, C., Preedy, V., Patel, V. (eds) *Comprehensive Guide to Post-Traumatic Stress Disorders*. Springer, Cham. https://doi.org/10.1007/978-3-319-08359-9_78
[29]. Skorstad M., Lie A., Conradi H.S., Heir T., Weisæth L. (2013). Work-related post-traumatic stress disorder. *Occupational Medicine*, 63(3), 175–182.
[30]. Spector, P. E. (1988). Development of the Work Locus of Control Scale. *Journal of Occupational Psychology*, 61(4), 335-340. https://doi.org/10.1111/j.2044-8325.1988.tb00216.x
[31]. Van Eerd, D., Irvin, E., Harbin, S., Mahood, Q., & Tiong, M. (2021). Occupational exposure and post-traumatic stress disorder: A rapid review. *Work* (Reading, Mass.), 68(3), 721–731. https://doi.org/10.3233/WOR-203406
[32]. Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the resilience scale. *Journal of Nursing Measurement*, 1(2), 165-178.
[33]. Wagnild, Gail. (2009). A Review of the Resilience Scale. *Journal of Nursing Measurement*, 17(2), 105–113. doi:10.1891/1061-3749.17.2.105
[34]. Yehuda R, Flory J. D. Differentiating biological correlates of risk, PTSD, and resilience following trauma exposure. *Journal of Traumatic Stress*. 2007;20(4):435–447.