

## Brief Report

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# Preparing for the Future Pandemic: Impact of Individual and Occupational Factors on Paramedics' Mental Health

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## Abstract

**Objectives:** The mental health of paramedics is critical for disaster response in order to provide rapid and effective interventions. This study aimed to determine the prevalence of post-traumatic stress disorder (PTSD) and related individual and occupational factors in Turkish paramedics during the eleventh month of the COVID-19 pandemic.

**Methods:** The “Sociodemographic Information Form,” “Life Events Checklist,” and “Post-Traumatic Stress Disorder Checklist” were used to collect data from 440 randomly selected paramedics in this cross-sectional study.

**Results:** The prevalence of PTSD was 59.8% in the 11<sup>th</sup> month of the COVID-19 pandemic. Multiple regression analysis revealed that approximately 25% of the total PTSD score could be independently explained by paramedics' general health situation and sociodemographic characteristics; 27% by crisis management skills, long working hours, a lack of equipment, and intensive work; and 40% by past traumatic experiences due to difficult life events during their professional practice, such as responding to gunshot wounds, becoming a victim of a gunshot attack, or sexual assault ( $P < 0.05$ ).

**Conclusions:** Integrating a mental health monitoring system into the health and safety program, providing paramedics with supervision and psychological assistance, and engaging them in disaster preparedness planning would be beneficial.

Paramedics are health care professionals who oversee the prehospital procedure from the time of an unexpected occurrence or disease until the patient arrives at the hospital. They must make rapid and precise selections because every minute counts during this procedure. Therefore, to increase the quality of care during disasters, individual and occupational mental health risk factors in paramedics must be addressed. World Health Organization reported that adverse working conditions pose a risk to mental health; globally, an estimated 12 billion working days are lost each year due to depression and anxiety, resulting in productivity losses of 1 trillion USD annually; and urgent measures to protect mental health are needed.<sup>1</sup> Traumatic experiences due to disasters at work are one of the most important factors that increase the burden of mental illness. Exposure to COVID-19 is classified as a traumatic event because it transcends the normal human experience.<sup>2</sup> The magnitude of the psychological impact due to the traumatic effect of the COVID-19 pandemic varies based on several factors, including biological characteristics (age, sex, chronic disease, etc.) and socioeconomic and cultural characteristics (such as the work environment and social support of individuals, the significance attributed to the event, and the level of psychological resilience).<sup>2–5</sup>

The prevalence and negative consequences of infectious diseases, which continue to exist with major epidemics, will increase with climate change. Studies have shown that mental problems such as exhaustion, PTSD (post-traumatic stress disorder), depression, anxiety, and sleep disorders increased during the pandemic compared to before the pandemic as a result of the stress experienced by paramedics during the pandemic.<sup>6–7</sup> Factors such as lack of personal protective equipment (PPE), changes in working hours, changing hospital practices, increased workload, lack of social support, uncertainty in managing a new disease, stigmatization, discrimination, selection of patients from different points, and community noncompliance with health and safety guidelines negatively affect the mental health of health care workers and increase the level of stress triggers in various mental illnesses.<sup>8–9</sup> The current study aims to provide evidence-based recommendations for disaster preparedness strategies by investigating the prevalence of PTSD among paramedics as well as the individual and occupational predictors of PTSD in terms of future pandemic preparation.

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## Methods

This cross-sectional study was conducted in Istanbul, Turkey's largest metropolis with a population of around 20 million people. 460 paramedics participated in this study, which used a random sampling procedure with a 95% confidence level. The response rate was 95.6%. Study approval was obtained from the X University Ethics Committee (February 20, 2020, 2020-20845-33).

The "Sociodemographic Information Form" consisting of paramedics' individual (age, sex, marital status, alcohol consumption, history of psychiatric treatment, general health status, self-care practices, and impact of work on private life, number of children) and working environment factors (crisis management skill, working hours, traffic density, and the adequacy of equipment and supplies) which was developed by researchers in the current study; "Life Events Checklist" for identifying stressful life events;<sup>10</sup> and "Post-Traumatic Stress Disorder Checklist," a valid and reliable measurement tool for screening PTSD,<sup>11</sup> were used to improve occupational health and safety measures based on the mental health of paramedics during disasters. Because the skewness and kurtosis indices of the PTSD score were between  $-0.820$  and  $0.084$ , parametric analyses were performed. After bivariate analyses, including *t* tests, analyses of variance, and the Pearson correlation test, multiple regression analysis (enter) was used to determine the independent effect of each independent variable on the PTSD scores and the magnitude of those effects, as well as to control for confounding variables.

## Results

The mean age of the 440 participants was  $29.9 \pm 7.34$  years, with 49.5% being female. Of the paramedics, 44% were married and around 35% had at least 1 child. Furthermore, 8.9% had undergone psychiatric treatment, 6.4% had a family history of mental illness,

and 2.3% had attempted suicide. We observed that approximately 1 in 2 paramedics were exposed to COVID-19, had an accident while traveling, and were exposed to fire and explosions, physical assault, and life-threatening injuries (Table 1).

The prevalence of PTSD was 59.8% in the 11<sup>th</sup> month of the COVID-19 pandemic. The mean PTSD score was  $38.6 \pm 22.1$ . Paramedics had substantially lower scores on the change in mood and cognitive subdimensions ( $P < 0.05$ ), with high scores on the "hyperarousal and hyperreactivity," "avoidance," and "intrusive thinking" subdimensions.

In bivariate analysis, there was no significant relationship between the total PTSD score and economic situation, smoking status, intervention in medical emergencies, falls and blunt traumas, occupational accidents, years of employment, or desire to change the place of work ( $P > 0.05$ ). Sex, age, marital status, number of children, educational background, general health status, history of psychiatric disorders, exposure to violence, working hours, alcohol use, intervention to gunshot wounds and suicide, traffic density, housing structures of multistory buildings without elevators and with narrow stairs, inability to allocate enough time for each patient in case of multiple patients, inadequacy of equipment/materials, the level of knowledge on ambulance services usage, inadequate penalties for crimes committed against health care workers, the risk of exposure to infectious diseases, lack of crisis intervention skills, and the impact of the work on personal life were significantly related to PTSD scores ( $P < 0.05$ ).

Factors underlying the development of PTSD were determined by applying multiple regression analysis to variables with a significant association. Being female, being young, consuming alcohol, having a history of receiving psychiatric treatment, practicing no self-care measure, and having a poor health status independently increased the PTSD score and explained 25% of the development of PTSD ( $P < 0.05$ ) (Table 2). The number of children, marital status, and impact of work on personal life were confounding variables ( $P > 0.05$ ).

**Table 1.** Distribution of traumatic experiences according to the life events checklist

	Yes		No		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Fire and explosion	239	55.2	191	44.1	433	100.0
Transportation accident	258	59.4	172	39.6	433	100.0
Serious accident at work, home, or during recreational activity	137	31.6	297	68.4	434	100.0
Exposure to toxic substances	122	28.3	308	71.5	431	100.0
Physical assault	224	51.6	208	47.9	434	100.0
Assault with a weapon	114	26.3	317	73.2	433	100.0
Sexual assault	95	21.9	338	77.9	434	100.0
Other unwanted or uncomfortable sexual experience	85	19.7	346	80.1	432	100.0
Combat or exposure to a war zone	70	19.7	363	83.8	433	100.0
Captivity	28	6.5	403	91.6	431	100.0
Life-threatening injury	181	41.7	253	58.3	431	100.0
Severe human suffering	73	17.0	355	82.6	430	100.0
Sudden violent death	128	29.7	301	69.8	431	100.0
Sudden accidental death	147	33.9	281	64.9	433	100.0
Serious injury, harm, or death you caused to someone else	23	5.3	409	94.7	432	100.0
Exposure to COVID-19	257	59.7	173	40.1	431	100.0

non-respondents are not included in the table as column

**Table 2.** Results of multiple regression analysis on individual characteristics explaining the PTSD score

Independent variable	B	Std. Error	Beta	t	Sig.
<b>Older age</b>	<b>-.562</b>	<b>.162</b>	<b>-.197</b>	<b>-3.465</b>	<b>0.001</b>
<b>Sex (female)</b>	<b>9.906</b>	<b>1.882</b>	<b>.236</b>	<b>5.264</b>	<b>0.001</b>
Number of children	.618	1.222	.028	.505	0.614
<b>Alcohol use</b>	<b>8.209</b>	<b>2.208</b>	<b>.168</b>	<b>3.717</b>	<b>0.001</b>
<b>History of psychiatric treatment</b>	<b>9.211</b>	<b>3.203</b>	<b>.127</b>	<b>2.876</b>	<b>0.004</b>
Marital status (Divorced/separated)	2.832	5.282	.023	.536	0.592
<b>General health status (poor)</b>	<b>6.640</b>	<b>1.955</b>	<b>.151</b>	<b>3.397</b>	<b>0.001</b>
<b>No self-care</b>	<b>13.742</b>	<b>3.571</b>	<b>.169</b>	<b>3.848</b>	<b>0.001</b>
Impact of work on private life	5.223	2.699	.086	1.935	0.054

$R = 0.497$ ;  $R^2 = 0.247$ ; Durbin-Watson = 1.814.

Previous traumatic experiences accounted for approximately 40% of the PTSD score (Table 3). Being subjected to or interfering in a weapon assault or sexual assault, intervening in a violent death, and inflicting harm or death on another person independently contributed to explaining PTSD scores ( $P < 0.05$ ). Other traumatic experiences did not predict the PTSD score ( $P > 0.05$ ). Factors related to the working environment accounted for approximately 27% of the PTSD score (Table 4). Lack of crisis management skills, long working hours, traffic density, and lack of equipment/supplies independently predicted the PTSD score ( $P < 0.05$ ).

### Discussion and Conclusion

These analyses highlight important gaps in the health and safety services and practices of paramedics before, during, and after disasters, which require immediate attention. Of the paramedics, 59.8% were found to be at risk for PTSD, and the prevalence of PTSD among paramedics increased 3-fold in the 11th month of the pandemic compared with that in previous studies. In studies conducted in the early stages of the pandemic, it was reported that prolonged contact with patients with COVID-19, having a relative or coworker who had COVID-19, insufficient knowledge on

**Table 3.** Results of multiple regression analysis of occupational exposures explaining the PTSD score

	B	Std. Error	Beta	t	P
Traffic accidents	-.070	.634	-.009	-.110	0.913
Occupational accidents	-.154	.581	.020	.265	0.791
Fires	.168	.560	.019	.300	0.764
Suicide	-.245	.602	-.031	-.407	0.685
Falls	-.269	.595	-.033	-.452	0.651
Gunshot wounds	1.256	.621	.158	2.022	0.044
Epidemic diseases	-.317	.417	-.041	-.760	0.448
Explosions	1.232	2.335	.029	.528	0.598
Serious accident	2.927	2.432	.063	1.203	0.230
Exposure to toxic substances	-3.270	2.749	-.068	-1.190	0.235
Physical assault	-.371	2.556	-.009	-.145	0.885
<b>Being subjected to/intervening in assaults with a weapon</b>	<b>6.746</b>	<b>3.119</b>	<b>-.137</b>	<b>-2.163</b>	<b>0.031</b>
<b>Being subjected to/intervening in sexual assault</b>	<b>14.607</b>	<b>3.851</b>	<b>.281</b>	<b>3.793</b>	<b>0.001</b>
Other unwanted/uncomfortable sexual experiences	-.452	4.017	-.08	-.113	0.910
Combat or exposure to a war zone	1.812	3.111	.030	.582	0.561
<b>Violent death</b>	<b>7.351</b>	<b>2.883</b>	<b>.157</b>	<b>2.549</b>	<b>0.011</b>
Sudden accidental death	1.459	2.846	.033	.512	0.609
<b>Causing damage/death to another person</b>	<b>11.965</b>	<b>5.198</b>	<b>.118</b>	<b>2.302</b>	<b>0.022</b>
Risk of contracting infectious diseases	3.804	2.198	.088	1.731	0.084

$R = 0.630$ ;  $R^2 = 0.397$ ; Durbin-Watson = 1.936.

**Table 4.** Results of multiple regression analysis of work environment factors explaining the PTSD score

Independent variable	B	Std. Error	Beta	t	Sig.
Reactions from patients/relatives because of late arrival	0.440	.399	-.061	-1.101	0.271
<b>Lack of crisis management skills</b>	<b>1.494</b>	<b>.338</b>	<b>.226</b>	<b>4.420</b>	<b>0.001</b>
Reactions from patients/relatives because they were unaware of the ambulance services	.321	.500	.040	.642	0.522
<b>Long working hours</b>	<b>.819</b>	<b>.333</b>	<b>.120</b>	<b>2.461</b>	<b>0.014</b>
<b>Traffic density</b>	<b>1.914</b>	<b>.357</b>	<b>.268</b>	<b>5.365</b>	<b>0.001</b>
<b>Insufficient PPE</b>	<b>.938</b>	<b>.388</b>	<b>.150</b>	<b>2.416</b>	<b>0.016</b>
Inappropriate housing structures	-.028	.437	-.004	-.065	0.948

$R = 0.520$ ;  $R^2$  square = 0.270; Durbin-Watson = 1.955.

transmission prevention, a lack of work experience, and inadequate PPE increased the prevalence of PTSD from 26% to 55%.<sup>12</sup> Consistent with other studies, young age, female sex, alcohol use, history of receiving psychiatric treatment, a poor general health status, long working hours, and a lack of equipment/materials were found to be risk factors for PTSD in our study.<sup>13–15</sup>

Approximately 40% of the predicted PTSD scores were associated with severe traumatic experiences, such as being subjected to/intervening in assaults with a weapon, being subjected to/intervening in sexual assault, intervening in a violent death, and causing injury/death to another person. It was reported that emergency department workers should be monitored for PTSD caused by cumulative exposure, emphasizing that PTSD should be considered an occupational disease.<sup>16–17</sup> Another important finding of this study is that crisis management skills and self-care are important protective factors against PTSD. Because crisis management includes the basic elements of trauma-informed care, it enables the paramedic to understand the reactions of the patient and his/her family/environment and react appropriately while increasing her/his resilience using self-care methods. The literature shows that emergency service workers have inadequate crisis management skills.<sup>18</sup> Analytical studies would help better understand the underlying causal nature of the relationships among the study variables.

The results of the present study should be interpreted considering several limitations. First, as this study involved a cross-sectional survey, it may be impossible to draw conclusions about the nature of the putative causal relationship between mental health and individual and occupational factors. Second, private ambulance services were excluded to control for sample selection bias arising from the engagement of state's paramedics with patients on their free days. Third, data were self-reported and may thus have been subject to recall bias and misclassification because disease reporting was not validated against medical records.

Despite the study's limitations, identifying risk and protective factors for mental health in disaster settings can directly assist in identifying essential interventions and setting priorities to protect and improve the mental health of front-line paramedics working during disasters. Based on the findings, the following recommendations are given within the scope of occupational health and safety services:

### Training and Education

Add courses on crisis management skills and trauma-informed approaches to pre- and post-graduation training programs.

### Resilience Building

Design and implement a comprehensive self-care plan that incorporates physical, emotional, social, intellectual (professional knowledge and growth-promoting activities), and spiritual dimensions to increase resilience.

### Workplace Regulations and Support

Regulate paramedics' working hours, provide adequate personal protective equipment (PPE), and reorganize work schedules.

### Peer Support and Supervision

To control the pervasive and severe impact of traumatic stress reactions and to prevent re-traumatization through the implementation of group or individual psychological first aid, psychoeducation, and supportive mechanisms such as trauma-informed peer support and supervision systems.

### Surveillance System and Management of Mental Health Conditions

To implement regular screening programs to identify paramedics at risk for PTSD, particularly those exposed to severe traumatic events, younger age, women, individuals with a history of psychiatric treatment, and those in poor and inadequate concern for their health. It is also advised that paramedics undergoing treatment for mental disorders not be assigned to severe traumatic events, and access to quality mental health services should be ensured.

These recommendations aim to create a supportive environment and provide necessary resources to enhance the mental well-being of paramedics facing the challenges of disaster response. In conclusion, while disasters are expected to increase because of climate change and inadequate infrastructure, developing occupational health and safety programs for paramedics working on the front lines of disasters will protect their right to health and improve the quality of health services provided to society during disasters.

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