BRIEF REPORT

JMS Journal of Medical Science

Posttraumatic Stress Disorder symptoms in persons involved in road accidents and paramedics

Aleksandra Parobkiewicz
Faculty of Psychology and Cognitive Science, Adam Mickiewicz University, Poznań, Poland
https://orcid.org/0000-0001-7874-5086
Corresponding author: aleksandra.jasielska@amu.edu.pl

Michał Ziarko
Faculty of Psychology and Cognitive Science, Adam Mickiewicz University, Poznań, Poland
https://orcid.org/0000-0002-7530-3167

Julia Krawczyk
Department of Internal Medicine and Diabetology, Poznan University of Medical Sciences, Poland
https://orcid.org/0000-0003-3825-1086

Jagna Jasielska
Liceum Ogólnokształcące nr 8 w Poznaniu, Polska

DOI: https://doi.org/10.20883/medical.e515

Keywords: PTSD, victims, perpetrators, road accidents, paramedics

Published: 2021-06-29

How to Cite: Parobkiewicz A, Ziarko M, Krawczyk J, Jasielska J. Posttraumatic Stress Disorder symptoms in persons involved in road accidents and paramedics. JMS [Internet]. 2021 Jun. 29;90(2):e515. doi:10.20883/medical.e515

ABSTRACT

Aim. The aim of the study was to assess the risk of posttraumatic stress disorder (PTSD) among persons involved in road accidents and paramedics. Little is known about similarity or difference of PTSD symptoms between these two groups involved in accident in voluntary and involuntary way.
Material and Methods. Persons involved in road accidents (N = 78) and paramedics (N = 106) completed the Polish version of the Impact of Event Scale–Revised.
Results. The percentage of those who reported PTSD symptoms was similar and insignificant among persons involved in road accidents (56%) and among paramedics (45%). A significant difference ($p < 0,01$) was observed between these groups, however. The total PTSD, intrusions, and avoidance were higher for persons involved in road accidents.
Conclusions. Victims, perpetrators, and helpers in road accidents were at a similar risk of PTSD. Peritraumatic interventions are recommended for all these groups.

Introduction

Trauma has been defined as "a state of disruption caused by stressors severe enough to threaten life or make one believe that one is about to die" [1]. One of the possible consequences of a traumatic event, such as a natural disaster, a road accident, a war, a rape, etc., is posttraumatic stress disorder (PTSD) [2]. It is generally acknowledged that between 9% and 15% of individuals who are exposed to a traumatic event subsequently develop PTSD [1].

The ICD-10 criteria for PTSD (F43.1) are as follows [source: http://medical.cfoapublications.co.uk/12594]:

"A. The patient must have been exposed to a stressful event or situation of exceptionally threatening or catastrophic nature, which would be likely to cause pervasive distress in almost anyone.

B. There must be persistent remembering or 'reliving' of the stressor in intrusive 'flashbacks', vivid memories, or recurring dreams, or in experiencing distress when exposed to circumstances resembling or associated with the stressor.

C. The patient must exhibit an actual or preferred avoidance of circumstances resembling or associated with the stressor, which was not present before exposure to the stressor.

D. Either of the following must be present:
   - inability to recall, either partially or completely, some important aspects of the period of exposure to the stressor.
   - persistent symptoms of increased psychological sensitivity and arousal (not present before exposure to the stressor), shown by any two of the following:
     - » difficulty in falling or staying asleep
     - » irritability or outbursts of anger
     - » difficulty in concentrating
     - » hypervigilance
     - » exaggerated startle response.

E. Criteria B, C, and D must all be met within 6 months of the stressful event or the end of a period of stress (for some purposes, onset delayed more than 6 months may be included, but this should be clearly specified)"[3].

People exposed to PTSD include both victims of accidents [4,5] and first responders helping them, such as paramedics [6,7]. Being involved in a road accident is only a "potentially traumatic" event. Its consequence is the so-called peritraumatic response—the process of stress appearing as a result of the person realizing what has happened. This period is followed by a natural return to mental balance. Sometimes, however, the natural peritraumatic response extends and intensifies, leading to mental health disorders, such as PTSD. Accident perpetrators may suffer from PTSD as well [8].

Due to their occupation, paramedics providing assistance to persons involved in road accidents are also exposed to PTSD [9]. Additionally, paramedics may develop *Secondary Traumatic Stress Disorder* (STSD or Compassion Fatigue)—the consequences experienced as a result of heavy stress associated with helping traumatized people [10]. STSD affects people who are not directly exposed to a traumatic event but experience PTSD symptoms similar to those experienced by victims. *Disorders of Extreme Stress Not Otherwise Specified* (DESNOS or *Complex PTSD*) [11,12] is a set of symptoms resulting from prolonged and recurring trauma. This view is supported by data attesting to the multiple exposure of paramedics to traumatic events [13].

Being involved in a road/traffic accident is unintentional in the case of both the victim and the perpetrator, while the assistance provided by a paramedic suggests voluntary behavior. Due to the difference in intentions between these two groups, the following research hypothese was posed: There is a difference in the PTSD symptoms between paramedics and persons involved in road accidents.

Material and Methods

The participants in the anonymous and voluntary study were two groups: (1) persons involved in road accidents (N = 78) and (2) paramedics (N = 106). The former group consisted of 44 women and 34 men (M_{age} = 39.33, SD_{age} = 10.11); 72% of them were accident victims and 28% were perpetrators of accidents; 62% were drivers, 23% were passengers, 14% were pedestrians, and 1% were cyclists. As far as the type of accident is concerned, in 67% of cases it was a collision, 12% of accidents were knockdowns, 6% involved hitting an obstacle (a wall, a tree), and 15% involved other circumstances (a rollover, a skid, falling into a ditch). In the group of paramedics there were 43 women and 63 men (M_{age} = 29.51, SD_{age} = 5.64); all of them were professionally active and worked in units of the State Medical Rescue System in the Wielkopolskie Voivodeship (Province), Poland; their mean length of service was M = 7.35 years (SD = 5.98). When indicating traumatic events experienced during the week preceding the study, 49% paramedics reported a death, 13% reported an accident, 9% indicated aggressive behavior of patients or their families, and 4% reported a situation of threat to a patient's life.

Table 1. Descriptive statistics, reliability coefficients, and correlations for the variables measured using IES-R

	M	SD	Min.	Max.	α	PTSD	Intrusion	Hyperarousal
PTSD	37.56	11.39	0	85	.96	-		
Intrusion	15.56	9.53	0	36	.89	.94*		
Hyperarousal	10.31	6.32	0	24	.87	.92*	.88*	
Avoidance	14.27	7.37	0	29	.82	.82*	.61*	.62*

M = mean; SD = standard deviation; Min. - minimum value; Max- maximum value; α = Cronbach's alpha reliability statistic
*p < .05. **p < .01.

Table 2. Comparison of persons involved in road accidents and paramedics in the scope of PTSD

	Persons involved ***M (SD)*** **[Range]**	**Paramedics** ***M (SD)*** **[Range]**	t	df	p	d
PTSD (IES-r)	40.15 (19.62) [3-85]	31.99 (21.73) [0-78]	2.799	233	.006	0.39
Intrusion	15.56 (9.00) [1-36]	11.45 (8.16) [0-29]	3.521	233	<.001	0.48
Hyperarousal	10.32 (6.04) [0-29]	10.00 (7.56) [0-30]	0.326	233	.745	-
Avoidance	14.27 (6.83) [1-24]	10.54 (6.96) [0-10]	3.892	233	<.001	0.44

M = mean; SD = standard deviation; t – t-Student's test; df = degrees of freedom; d – Cohen's test

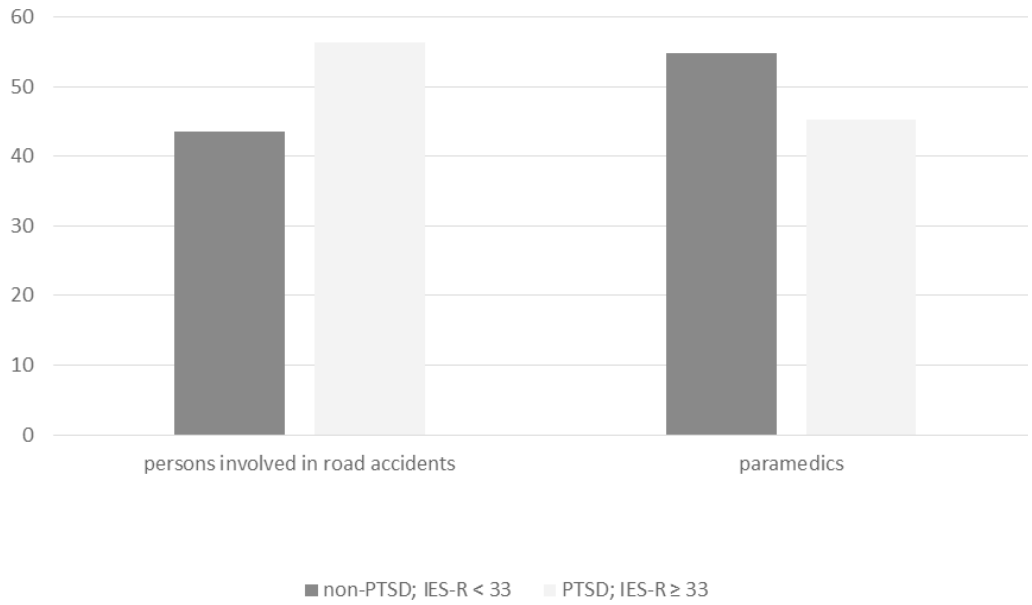

Figure 1. Percentages of participants with IES-R scores below and above 33 points among persons involved in road accidents and among paramedics

To assess the level of PTSD symptoms, we used the Polish version of the Impact Event Scale–Revised (IES-R) [14,15]. The IES-R consists of 22 items. Results include the total raw score and raw scores on three subscales: Intrusion (8 items; e.g., "I had dreams about it") , Avoidance (8 items; e.g., "I tried not to think about it"), and Hyperarousal (6 items; e.g., "I felt irritable and angry"). For each item, the respondent is asked to report the level of distress experienced in the past 7 days. The items are rated on a 5-point scale, from 0 = *not at all* to 4 = *extremely*. In general, the IES-R is not used to diagnose PTSD; however, cut-off scores for a preliminary diag-

nosis of PTSD have been cited in the literature (https://www.ptsd.va.gov/professional/assessment/adult-sr/ies-r.asp). The cut-off score of 33 points suggested a possible diagnosis of PTSD.

All procedures performed in study involving human participants were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki declaration and its further amendments or comparable ethical standards. This study was approved by the Bioethical Commission at Poznan University of Medical Science (Date: June 17, 2020, reference number 475/20). Written informed consent was obtained from all individual participants included in the study.

Results

A statistical analysis to test the hypothesis put forward was made in IBM SPSS Statistics, version 27. Key descriptive statistics were analysed with the use of the software, which made it possible to study the distributions of successive measured variables. Parametric tests were performed on all variables because skewness values did not exceed the conventional absolute value equals 2. The hypothesis was tested with the use of t-Student test. The significance level was adopted at the threshold of $p = 0.01$.

Basic descriptive statistics, reliability coefficients, and correlations for the study variables are presented in Table 1.

First, based on the cut-off score (IES-R ≥ 33 points), we identified the participants who might show PTSD symptoms (Figure 1). These participants accounted for 56% in the group of persons involved in accidents and 45% in the group of paramedics. The difference between these percentages was not statistically significant ($chi^2 = 2.610$, $df = 1$, $p = .128$).

The results of Student's *t*-test for the comparison of variables between independent groups are presented in Table 2.

The mean total IES-R score and the mean scores on the Intrusion and Avoidance scales are significantly higher in the group of persons involved in accidents than in the group of paramedics. The value of Cohen's *d* indicates a weak relationship between belonging to a particular group and PTSD dimensions.

Discussion

Persons involved in road accidents report a higher level of PTSD symptomatology than paramedics. This is the case for total subjective posttaumtic stress and intrusion (intrusive thoughts, nightmares, intrusive feelings and imagery, dissociative-like re-experiencing) and avoidance (numbing of responsiveness, avoidance of feelings, situations, and ideas). This result probably stems from the fact that for paramedics the occupational situation is intentional and voluntary, whereas for persons involved in accidents the situation is unintentional and involuntary. This perspective corresponds with the transactional understanding of stress as a loss/harm (one that has been suffered) or threat (anticipated loss) in persons involved in accidents, while in the case of paramedics the stressful situation is regarded as a challenge (anticipation of both losses and gains) [16]. The observed difference may also stem from the different organization of autobiographic memory. For paramedics, certain professional activities are routine; consequently, they have a general event scheme (referred to as script), which is based on the principle of generality and contains stable semantic knowledge. By contrast, in the memory of persons involved in accidents the accident is an episodic recollection, temporally organized and characterized by specific features, for which there is no scheme that could organize experience [17].

The observed difference can be also a consequence of presence of more women in group of persons involved in accident and age differentiation between groups. Women have a two to three times higher risk of developing PTSD compared to men [18]. As mentioned above, the group of persons involved in accidents was older than paramedics *ca.* 10 years. Data shows that middle-aged adults (ages 35-64) reported significantly higher the prevalence of past-year PTSD then young (ages 20-34) and experienced significantly more traumatic experiences [19].

In both groups the percentage of participants who report the presence of symptoms that indicate partial or subclinical PTSD is relatively high. Because in these groups there is a risk of PTSD development, interventions aimed at reducing the possible psychological costs are recommended. As part of peritraumatic prevention, individuals

who need professional help should be identified as quickly as possible through screening examinations by means of the IES-R and provided with professional assistance. Effective intervention should address both the emotional and cognitive spheres. It is recommended to apply, for instance, selected techniques of cognitive behavioral therapy from the prolonged exposure protocol [20], dedicated prevention programs for paramedics [21], or interventions for perpetrators of traffic accidents [22].

The fundamental limitation of the present study is the use of a self-report measure to assess a clinical disorder. IES-R score should be viewed in prognostic rather than diagnostic terms. This is because the measure yields the self-assessed level of posttraumatic stress symptoms, and it is only the use of in-depth clinical methods that allows for an objective diagnosis of PTSD. The next limitation is the modest sample. Another limitation is the heterogeneous group of persons involved in accidents, composed of both victims and perpetrators. It is true that victims and causers can experienced different affective states and consequences of involving in motor vehicle accidents e.g., anxiety [23] or self-blame [22]. But the presence of PTSD at these participants [8] makes that very often they are treated as non-identical but one group [4]. Probably it is justified when we realize that for victim and causer the car accident it is perceived inescapable, where they are tumbling out of control. This point of view corresponds with Type I traumatic events from Typology of Traumatic Events which refers to a single, discrete catastrophic event, such as a car accident or natural disaster. Although these events traumatize individuals, their responses are both attenuated or minimized by the balance of risk and protective factors [24].

In future studies, authors might want to include individual variables that may predispose both persons involved in road accidents and paramedics to coping with traumatic stress; they might also want to extend the scope of research to include employees of emergency services (e.g., firefighters or police officers) [25] or medical personnel (e.g., radiographers or surgical oncologists) [26]. The inclusion of these occupational groups would make it possible to broaden the research to cover the still insufficiently explored complex trauma or secondary trauma.

Conclusions

Conclusion: our results point toward the similar probability of the appearance of PTSD symptoms among road accident participants and paramedics. Although the declared presence of PTSD symptoms among paramedics is lower, it may be exacerbated by the work performed. Therefore, we recommend preventive programs in this professional group.

Acknowledgements

Conflict of interest statement
The authors declare no conflict of interest.

Funding sources
There are no sources of funding to declare.

References

1. Valent P. Definitions of trauma. Encyclopaedia of Trauma. In: Figley ChR, editor. Encyclopaedia of Trauma. An Interdisciplinary Guide. Los Angeles: Sage; 2012. p. 676-679.
2. Rosen G (editor). Posttraumatic stress disorder: Issues and controversies. Wiley: Hoboken, NJ; 2004.
3. International Statistical Classification of Diseases and Related Health Problems, ICD-10. World Health Organization; 2009.
4. Popiel A, Zawadzki B, Pragłowska, E, Teichman Y. Prolonged exposure, paroxetine and the combination in the treatment of PTSD following a motor vehicle accident. A randomized clinical trial – The "TRAKT" study. J Beh Ther Exp Psy. 2015;48:17-26. doi:10.1016/j.jbtep.2015.01.002.
5. Kuhn E, Drescher K, Ruzek J, Rosen C. Aggressive and unsafe driving in male veterans receiving residential treatment for PTSD. J Trauma Stress. 2010;23(3):399-402. doi:10.1002/jts.2053613.
6. Ogińska-Bulik N. Two faces of trauma. Negative and positive effects of traumatic events in emergency service employees. Warszawa, Difin; 2015.
7. Klimley KE, Van Hasselt VB, Stripling AM. Posttraumatic Stress Disorder in Police, Firefighters, and Emergency Dispatchers. Aggress Violent Beh. 2018;43:33-44. doi:10.1016/j.avb.2018.08.005.
8. Merecz-Kot D, Waszkowska M, Wężyk A. Mental health status of drivers – Motor vehicle accidents perpetrators. Med Pr. 2015;66(4):525-538. doi:10.13075/mp.5893.00203.
9. Jasielska A, Ziarko M. General and specific individual post-traumatic stress disorder-related mechanisms among paramedics. Med Pr. 2019;70(1):53-66. doi:10.13075/mp.5893.00757.
10. Figley CR (editor). Compassion Fatigue: Coping With Secondary Traumatic Stress Disorder In Those Who Treat The Traumatized. New York: Brunner/Mazel; 1995.

11. Courtois ChA. Complex trauma. In: Figley ChR, editor. Encyclopaedia of Trauma. An Interdisciplinary Guide. Los Angeles: Sage; 2012. p. 139-142.
12. Boothroyd RA, Green S, Dougherty A. Evaluation of Operation Restore: A brief intervention for first responders exposed to traumatic events. Traumatology.2018;25(3):162-171. doi:10.1037/trm0000168.
13. Regehr C. Bringing the trauma home: spouses of paramedics. J Loss Trauma. 2005;10(2):97–114. https://doi.org/10.1080/15325020590908812
14. Weiss D, Marmar C. The Impact of Event Scale-Revised. In: Wilson J, Keane T, editors. Assessing psychological trauma and PTSD: A handbook for practitioners. New York: Guildford Press; 1997. p. 399-411.
15. Juczyński Z, Ogińska-Bulik N. Measurement of posttraumatic stress disorder- Polish version of Impact Event Scale-Revised. Psychiatra. 2009;6(1):15-25.
16. Lazarus RS, Folkman S. Stress, appraisal and coping. New York: Springer-Verlag; 1984.
17. Maruszewski T. Autobiographical memory- new data. Neuropsychiatria i Neuropsychologia. 2010;5(3-4-):122-129.
18. Olff M. Sex and gender differences in post-traumatic stress disorder: an update. Eur J Psychotraumato. 2017;8(sup4). doi:10.1080/20008198.2017.1351204.
19. Reynolds K, Pietrzak RH, Mackenzie CS, Chou KL, Sareen J. Post-traumatic stress disorder across the adult lifespan: Findings from a nationally representative survey. Am J Geriat Psychiat. 2016;24:81-93. doi:10.1016/j. jagp.2015.11.001.
20. Foa EB, Hembree E, Rothbaum BO. Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences, therapist guide. New York: Oxford University Press; 2007.
21. Popiel A, Zawadzki B, Pragłowska E, Habrat P, Gajda P. Effective under stress. Sopot: GWP; 2019.
22. Popiel A. Cognitive therapy of trauma related guilt in patients with PTSD. Psychiatr Pol. 2014;48(3):615–625.
23. Ścigała DK, Zdankiewicz-Ścigała E. The Role in Road Traffic Accident and Anxiety as Moderators Attention Biases in Modified Emotional Stroop Test. Front Psychol. 2019;10:1575. doi:10.3389/fpsyg.2019.01575.
24. Terr L. Childhood traumas: An outline and overview. In: Horowitz M, editor. Essential papers on posttraumatic stress disorder. New York: University Press; 1999. p. 61–81.
25. Marmar CR, McCaslin SE, Metzler TJ, Best S, Weiss DS, Fagan J, Liberman A, Pole N, Otte Ch, Yehuda R, Mohr D, Neylan Th. Predictors of posttraumatic stress in police and other first responders. Annals New York Academy of Sciences. 2006;1071(1):1-18. Doi:10.1196/annals.1364.001.
26. Kirby R, Shakespeare-Finch J, Palk G. Adaptive and Maladaptive Coping Strategies Predict Posttrauma Outcomes in Ambulance Personnel. Traumatology. 2010;17(4):25-34. Doi:10.1177/1534765610395623.