

The mediating role of rumination in the alexithymia-PTSD relation among employees of emergency services – paramedics and emergency call centre operators

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ABSTRACT

Introduction: The aim of the study was to investigate the relationship between alexithymia, two types of ruminations (intrusive and deliberate) and post-traumatic stress disorder (PTSD) symptoms for two groups of emergency workers working in Poland: paramedics and emergency call centre operators.

Material and methods: The research project was conducted in the Wielkopolskie voivodship in Poland. The participants were paramedics ($n = 72$; 54 men, 18 women) and dispatchers ($n = 66$; 35 men, 31 women). The following Polish versions of standardized tools were used: the Impact of Event Scale-Revised (IES-R), Toronto Alexithymia Scale-20 (TAS-20), and the Event Related Rumination Inventory (ERRI).

Results: Analysis of the correlation with Spearman's test demonstrated a statistically significant relationship in both groups between the symptoms of PTSD and ruminations and alexithymia and intrusive ruminations. The correlation between intrusive ruminations and PTSD was stronger for the paramedic group. Also, in the paramedic group, ruminations acted as a mediator for the relation of alexithymia and the intensity of post-traumatic stress.

Conclusions: The results of the study provide some evidence that paramedics present more PTSD symptoms than emergency call centre operators. The important individual features which increase PTSD are emotional-cognitive aspects of mental processing: ruminations and alexithymia. The paramedics' direct participation in traumatic events is more overloading for them than the indirect participation in traumatic events for dispatchers.

KEY WORDS: traumatic stress, post-traumatic stress disorder, alexithymia, rumination, paramedics, dispatchers.

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INTRODUCTION

In comparison to other professions, workers in emergency services are subject to a higher risk of experiencing potentially traumatic events while performing their professional duties. These professions include emergency call centre operators as well as paramedics [1, 2]. The main tasks of an emergency call centre operator include receiving and registering reports to the emergency number (112) as well as transferring them to ser-

vice dispatchers, such as the police, fire department or public medical rescue. In the European Union, the system of informing about emergencies is treated as “your line of life in the EU” [3, 4]. For that reason, a career as an emergency call centre operator often involves multiple indirect forms of participation in potentially traumatic events, which may lead to the development of post-traumatic stress disorder (PTSD) [5, 6]. The role of an emergency call centre operator is a niche profes-

sion, performed by only 1364 people in the country, who work in 17 provincial emergency call centres (an average of 80 people per province). In the Greater Poland area, this profession is performed by only 121 people [7].

The main task of paramedics is to provide immediate, direct and professional help to people whose lives are in sudden danger, to the injured in unfortunate accidents or catastrophes or to individuals who find themselves in a sudden health crisis [8]. Additionally, paramedics are exposed to stressors that are distinctive to their work, e.g., making a decision to stop rescuing someone's life, informing relatives about a death, risking their own lives and health in situations involving catastrophe victims and experiencing periods of intensified work interspersed with periods of inactivity [9]. Current epidemiological studies indicate that a majority of paramedics who have been exposed to death reveal symptoms of post-traumatic stress disorder [10].

Research shows that workers of emergency services, similar to individuals who participate in accidents, are subject to the negative consequences of traumatic stress. Post-traumatic stress disorder (PTSD) has been identified as a major health threat [5, 11]. PTSD is one of the anxiety disorders that occurs after psychologically exhausting incidents, such as natural disasters, traffic accidents, or being a victim of violence). Furthermore, it seems justified to consider the occurrence of vicarious trauma as well as complex trauma in both professions [12, 13]. The effects that individuals experience under high levels of stress related to providing aid to people after trauma are defined as secondary traumatic stress disorder (STSD), also referred to as compassion fatigue (CF) [14]. STSD applies to people who are not directly subjected to a traumatic event but exhibit PTSD symptoms similar to those of trauma victims, such as therapists, workers in emergency services, doctors, nurses or close relatives of the victims. Likewise, there are symptoms of disorders of extreme stress not otherwise specified (DESNOS or complex PTSD) [13]. DESNOS is a group of symptoms that result from long-term repetitive trauma, and although it was originally created to describe symptoms in individuals who have suffered abuse, its symptoms can also be found among workers in emergency services. This is supported by data that provide information about multiple exposures of emergency services workers to traumatic events [15-18].

People who have experienced extreme situations, such as surviving a concentration camp, being a war victim, or experiencing sexual abuse or rape, often exhibit features specific to alexithymia. Similarly, paramedics have shown a moderate positive correlation between alexithymia and PTSD [19]. Alexithymia is a deficit characterised by an inability to symbolically process emotional experiences, resulting in a diminished ability to verbalise emotions [20]. In the given context, it is difficult to determine unambiguously whether alexithymia

is a risk factor or a result of PTSD. In the second case, it would be reasonable to consider secondary alexithymia, which is a protective strategy with a reactive nature; it is based on repressive coping with emotions and chronic stress that accompanies trauma, for example [21].

Ruminations, which can be described as persistent and intrusive thoughts related to negative events and the emotions associated with them, share a cognitive-emotional process characteristic similar to alexithymia [22]. It has been proven that paramedics with PTSD symptoms exhibit a stronger tendency to ruminate compared to paramedics who do not appear to have PTSD [19]. On the other hand, a relationship has been identified among emergency service workers between ruminations, suppression, work-related stress, and stress-related symptoms [15]. Additionally, ruminations share similarities with intrusions, which are one of the symptoms of PTSD. Traditionally, ruminations have been believed to be a key element in psychological disorders such as depression or generalised anxiety disorder. However, it has recently been suggested that ruminations may also have an adaptive role, leading to the differentiation of the two types of ruminations [23]. The first type can be described as intrusive, repetitive and self-criticising thoughts that do not have a direct connection with the current state of an individual. The other kind of rumination is adaptable rumination, which is deliberate in nature. Intrusive ruminations may intensify feelings of distress and PTSD symptoms in individuals with PTSD, while deliberate ruminations are believed to facilitate coping with trauma.

The model that includes intrusive ruminations as a mediator between alexithymia and PTSD should differ from the model that considers deliberate ruminations as a mediator. Depending on their nature, ruminations resulting from an individual's reaction to a traumatic situation may influence the development of PTSD. The goal of this research was to create a model that explores the relationships between alexithymia, ruminations, and post-traumatic stress in a group of emergency call centre operators and paramedics. These individuals, due to the nature of their professions, are often more exposed to potentially traumatic events compared to the general population [1, 2].

The present research aimed to investigate answers to two questions.

- 1) Do emergency call centre operators differ from paramedics in terms of post-traumatic stress disorder, alexithymia or ruminations?
- 2) Do ruminations play a mediating role in the relationship between alexithymia and post-traumatic stress disorder?

MATERIAL AND METHODS

The sample included 138 participants who were professionally active emergency service workers: emergency call centre operators ($n = 66$) who work in the Emer-

gency Centre in Poznań and paramedics ($n = 72$) who work in units of the National Medical Rescue System in Greater Poland. The majority of the participants were male (61.60%). The profession of emergency call centre operator was performed by a similar percentage of women ($n = 35$; 53%) and men ($n = 31$; 47%). On the other hand, the profession of paramedic was predominantly performed by men ($n = 54$; 75%) compared to women ($n = 18$; 25%) ($\chi^2 = 11.437$; $p = 0.001$), reflecting the fact that more men than women work in this profession.

Data were collected using self-report questionnaires. The study was conducted between September and December 2020 during individual meetings with paramedics and emergency call centre operators at their workplaces. Participation in the study was anonymous and voluntary. The participants completed the Polish versions of standardised tools, which included:

1. The Impact of Event Scale-Revised (IES-R) measures the intensity of PTSD symptoms. It consists of 22 statements and 3 subscales: PTSD intrusion (e.g., “I had troubles staying asleep”), avoidance (e.g., “I tried not to talk about it”), and hyperarousal (e.g., “I had troubles concentrating”) [24]. Participants rate each statement on a 5-point scale, ranging from 0 (not at all) to 4 (extremely). The total score represents the subjective level of discomfort related to the experienced trauma. Based on this score, we could differentiate between groups with low and moderate/high-intensity PTSD symptoms. The threshold value was set as 33 points (or $M = 1.5$ points).
2. Toronto Alexithymia Scale-20 (TAS-20) measures alexithymia [25]. The scale consists of 20 statements and includes 3 subscales that measure Difficulty Describing Feelings (e.g., “It is difficult for me to find the right words for my feelings”), Difficulty Identifying Feeling (e.g. “I am often confused about what emotion I am feeling”) and Externally Oriented Thinking (e.g. “I prefer talking to people about their daily activities rather than their feelings”). Participants rate each statement on a 5-point scale, where 1 means “I totally disagree”, and 5 means “I totally agree”.
3. The Event Related Rumination Inventory (ERRI) measures two types of ruminations: intrusive (e.g., “Thoughts about the event caused me to relive my experience”) and deliberate (e.g., “I forced myself to deal with my feelings about the event”). This inventory consists of 20 items, with 10 items for each type of rumination style. Participants rate themselves on a 4-point scale, where 0 stands for “not at all” and 3 stands for “often” [26].

RESULTS

The collected data were analysed in four steps. Firstly, we checked if there were differences in the intensity of post-traumatic stress, alexithymia or ruminations between emergency call centre operators and paramedics.

Subsequently, we used the Mann-Whitney U test to examine whether there were any within-group differences in the paramedics and emergency call centre operators for any of the variables considered in the study. As a third step, we conducted Pearson correlation analyses and regression analyses to analyse correlations between PTSD, alexithymia and ruminations. Stepwise regression analysis was used. PTSD was established as a dependent variable, while alexithymia and ruminations were considered as independent variables. Lastly, to examine the hypothesis regarding the mediating role of ruminations (as the mediator) in the relationship between alexithymia (as the independent variable) and the intensity of post-traumatic stress (as the dependent variable), we conducted a mediation analysis following the approach suggested by Preacher and Hayes [27]. We used a resampling method with 5,000 repetitions to conduct the mediation analysis. The analyses were conducted separately for the paramedic and emergency centre operator groups. PS IMAGO and the macro PROCESS add-on were used as a statistical tool for the analysis.

The average age of the participants was 33.60 ($SD = 8.43$), and their job seniority was 8.36 ($SD = 7.98$). There were differences observed between the emergency call centre operators and paramedics who participated in the study in terms of age ($M_{Operators} = 31.09$, $SD_{Operators} = 7.72$; $M_{Paramedics} = 35.86$, $SD_{Paramedics} = 8.46$; $t = -3.449$, $p = 0.001$) and job seniority ($M_{Operators} = 3.81$, $SD_{Operators} = 2.46$; $M_{Paramedics} = 12.53$, $SD_{Paramedics} = 8.98$; $t = -7.631$, $p < 0.001$).

The participants worked an average of 46.47 hours per week ($SD = 10.95$) in their main profession and 12.25 hours per week ($SD = 15.41$) in additional work. Paramedics spent more time at work compared to the emergency call centre operators ($M_{Operators} = 43.74$, $SD_{Operators} = 6.78$; $M_{Paramedics} = 48.96$, $SD_{Paramedics} = 13.27$; $t = -2.872$, $p = 0.005$). However, the time dedicated to additional work did not differ significantly between these two professional groups ($M_{Operators} = 11.38$, $SD_{Operators} = 14.70$; $M_{Paramedics} = 13.04$, $SD_{Paramedics} = 16.10$; $t = -0.632$, $p = 0.529$). Furthermore, it was found that the age of the participants ($r = 0.328$; $p < 0.001$) and their job seniority ($r = 0.343$; $p < 0.001$) positively correlated with the intensity of post-traumatic stress.

The basic statistics of all measured variables and reliability coefficients of the methods used are presented in Table 1.

Prior to conducting the correlations between the variables, a data completion procedure using the EM model was performed. The data were filled in separately for each variable.

Since the variables did not follow a normal distribution, we used the Mann-Whitney U test to examine whether the compared professional groups differed in terms of the intensity of post-traumatic stress, alexithymia and ruminations (Table 2). The results of the analysis were consistent with our expectations, as we observed signifi-

TABLE 1. Descriptive statistics, reliability coefficients and the Kolmogorov-Smirnov test value obtained for the following variables: post-traumatic stress disorder, alexithymia and ruminations

Variable	Min	Max	M	SD	α	Kolmogorov-Smirnov test	
						Z	p
PTSD total	0.00	107.00	37.69	25.62	0.97	0.12	< 0.001
Intrusions	0.00	40.00	12.83	10.55	0.95	0.16	< 0.001
Hyperarousal	0.00	33.00	11.76	8.02	0.91	0.11	< 0.001
Avoidance	0.00	35.00	13.10	8.52	0.91	0.09	0.011
Alexithymia total	24.00	79.00	44.99	10.66	0.79	0.06	0.200
Difficulty describing feeling	7.00	31.00	13.77	5.35	0.80	0.12	< 0.001
Difficulty identifying feelings	5.00	24.00	12.11	4.00	0.79	0.08	0.030
Externally oriented thinking	11.00	30.00	19.10	4.06	0.65	0.08	0.016
Intrusive ruminations	0.00	40.00	15.68	11.69	0.98	0.11	< 0.001
Deliberate ruminations	0.00	37.00	17.23	8.80	0.94	0.07	0.094

α – Cronbach's alpha

TABLE 2. Comparison of emergency call centre operators and paramedics in post-traumatic stress disorder, alexithymia and ruminations

Variable	Profession (M ± SD)		Mann-Whitney U test		
	Emergency call centre operators (n = 66)	Paramedics (n = 72)	U	p	Hedges' g
PTSD total	0.0054.19 ± 23.54	54.19 ± 23.54	4360.50	< 0.001	1.82
Intrusions	5.06 ± 3.93	19.94 ± 9.66	4525.00	< 0.001	1.99
Hyperarousal	6.42 ± 4.72	16.66 ± 7.27	4225.00	< 0.001	1.66
Avoidance	8.21 ± 6.27	17.59 ± 7.83	3890.00	< 0.001	1.32
Alexithymia total	40.36 ± 8.87	49.23 ± 10.45	3552.50	< 0.001	0.91
Difficulty describing feeling	12.54 ± 4.88	14.90 ± 5.54	3005.50	< 0.001	0.45
Difficulty identifying feelings	10.94 ± 3.92	13.18 ± 3.80	3182.00	0.001	0.58
Externally oriented thinking	16.88 ± 3.05	21.14 ± 3.81	3834.50	< 0.001	1.23
Intrusive ruminations	7.14 ± 6.62	23.52 ± 9.67	4368.00	< 0.001	1.96
Deliberate ruminations	11.75 ± 6.96	22.26 ± 7.16	4018.50	< 0.001	1.49

cant differences between the groups in terms of the intensity of post-traumatic stress, alexithymia and ruminations. Paramedics exhibited higher levels in all tested variables.

To examine the relationships between the variables included in the study, we used the Spearman correlation coefficient (ρ) (Table 3). The analysis revealed that in the emergency call centre operator group, the level of post-traumatic stress was positively correlated with both intrusive ruminations ($\rho = 0.38$; $p < 0.01$) and deliberate ruminations ($\rho = 0.38$; $p < 0.01$). Additionally, alexithymia was positively correlated with intrusive ruminations ($\rho = 0.32$; $p < 0.01$).

Similar relationships were observed in the paramedic group. Intrusive ruminations ($\rho = 0.73$; $p < 0.01$) and deliberate ruminations ($\rho = 0.57$; $p < 0.01$) were positively correlated with the level of post-traumatic stress.

Additionally, alexithymia was positively correlated with post-traumatic stress ($\rho = 0.44$; $p < 0.01$), intrusive ruminations ($\rho = 0.41$; $p < 0.01$) and deliberate ruminations ($\rho = 0.36$; $p < 0.01$).

In comparison to the group of emergency call centre operators, the group of paramedics exhibited higher values of correlation coefficients. To determine whether these two groups differed significantly, we conducted further analysis. The relationship between intrusive ruminations and PTSD was found to be significantly stronger in the paramedic group ($z = 3.03$; $p < 0.001$). However, there was no significant difference in the strength of correlations between deliberate ruminations and PTSD ($z = 1.42$; $p = 0.156$) or between alexithymia and intrusive ruminations ($z = 0.60$; $p = 0.551$) or deliberate ruminations ($z = 0.60$; $p = 0.551$).

TABLE 3. Correlation matrix. Correlation between variables

	1	1a	1b	1c	2	2a	2b	2c	3a	3b
	Emergency call centre operators									
1. PTSD total		0.80**	0.82**	0.83**	0.20	0.29*	0.03	0.11	0.38**	0.38**
1a. Intrusions	0.95**		0.73**	0.43**	0.18	0.36**	0.01	-0.01	0.51**	0.42**
1b. Hyperarousal	0.94**	0.88**		0.49**	0.24	0.39**	-0.02	0.07	0.33**	0.35**
1c. Avoidance	0.92**	0.81**	0.81**		0.16	0.09	0.09	0.20	0.20	0.23
2. Alexithymia total	0.44**	0.42**	0.44**	0.38**		0.78**	0.79**	0.62**	0.32**	0.11
2a. Difficulty describing feeling	0.46**	0.42**	0.43**	0.43**	0.89**		0.48**	0.18	0.41**	0.29*
2b. Difficulty identifying feelings	0.42**	0.41**	0.39**	0.43**	0.75**	0.60**		0.30*	0.12	-0.01
2c. Externally oriented thinking	0.15	0.16	0.22	0.02	0.63**	0.37**	0.22		0.11	-0.13
3a. Intrusive ruminations	0.73**	0.76**	0.67**	0.64**	0.41**	0.38**	0.40**	0.22		0.73**
3b. Deliberate ruminations	0.57**	0.58**	0.56**	0.48**	0.36**	0.30*	0.40**	0.17	0.67**	
	Paramedics									

* $p < 0.05$; ** $p < 0.01$, correlation coefficients for patients in biological treatment are reported in upper right side of table; correlation coefficients for patients in non-biological treatment are shown in lower left side of table

TABLE 4. PTSD predictors in paramedics and emergency call centre operator group – stepwise regression analysis

Variables	β	t	p
Paramedics			
Intrusive ruminations	0.780	10.424	< 0.001
$R^2 = 0.60$; $F = 108.658^{**}$			
Emergency call centre operator group			
Deliberate ruminations	0.360	3.087	0.003
$R^2 = 0.13$; $F = 9.530^{**}$			

Stepwise regression analysis was used to examine the correlations between the variables (see Table 4). In the paramedic group, intrusive ruminations accounted for 60% of the total variance in PTSD ($\beta = 0.78$; $t = 10.424$; $p < 0.001$; $R^2 = 0.60$; $F = 108.658^{**}$). On the other hand, in the emergency call centre operator group, reflective ruminations were found to be significant in explaining 13% of the variance in PTSD ($\beta = 0.36$; $t = 3.087$; $p = 0.003$; $R^2 = 0.13$; $F = 9.530^{**}$).

The analysis of simple mediations revealed a different role of ruminations for emergency call centre operators

and paramedics. For emergency call centre operators, ruminations did not act as a mediator in the relationship between alexithymia and the intensity of post-traumatic stress. However, in the paramedic group, ruminations did serve as a mediator. The observed correlations suggest that the high level of post-traumatic stress among paramedics may be sustained due to their tendency to excessively ruminate, both in an intrusive and deliberate manner. In the case of intrusive ruminations, the observed mediation is complete, indicating that adding another variable is not necessary to understand

TABLE 5. Mediation of intrusive and deliberate ruminations between alexithymia and PTSD for emergency call centre operators and paramedics

	Paths				Summary of model			Sobel's test		95% CI	
	α	b	c	c'	R^2	F	p	Z	p	Lower	Upper
Emergency call centre operators											
Intrusive ruminations	0.18**	0.18	0.14*	0.11	0.08	3.884	0.026	1.407	0.159	-0.01	0.12
Deliberate ruminations	0.10	0.20**	0.15*	0.12	0.15	6.806	0.002	0.827	0.408	-0.03	0.09
Paramedics											
Intrusive ruminations	0.36**	0.81**	0.41**	0.12	0.61	57.252	< 0.001	3.646	< 0.001	0.18	0.44
Deliberate ruminations	0.29**	0.48**	0.41**	0.28**	0.33	18.753	< 0.001	2.490	0.013	0.11	0.27

* $p < 0.05$; ** $p < 0$.

the relationship between alexithymia and post-traumatic stress. However, for deliberate ruminations, partial mediation was observed, suggesting that there are other factors that mediate this relationship (see Table 5).

DISCUSSION

In light of the obtained results, paramedics are a group that exhibits more symptoms of post-traumatic stress. They have higher levels of post-traumatic stress and its three components: intrusion, avoidance and hyperarousal. Paramedics directly face traumatic events in their line of work, while emergency call centre operators experience them indirectly [4]. Although the notion of secondary traumatic stress disorder, which has been analysed in the literature, suggests that direct contact with a potentially traumatic event is not necessary for the development of post-traumatic stress disorder (PTSD), the obtained results indicate that being directly exposed to potentially traumatic events is a more significant risk factor for PTSD [14]. From this perspective, issues related to the interpretation of the event appear to be secondary [2]. However, it is possible that paramedics are also more susceptible to interpreting their job not only as a challenge but also as a threat, considering the risks they face while providing emergency medical assistance and risking their own lives. Another factor that highlights the mental strain experienced by paramedics (alongside defence forces and prison officers) is the highest risk of suicide observed within this group [28].

The positive correlation between alexithymia and PTSD observed in this study is consistent with earlier findings from studies on paramedics [19]. However, for the group of emergency call centre operators, alexithymia did not emerge as a predisposing factor for the development of PTSD. These results suggest that alexithymia may be a consequence of experiencing chronic stress that accompanies potentially traumatic events. It is highly probable that paramedics employ a compensatory mechanism known as secondary alexithymia, which arises from chronic repressive coping with emotional experiences [19]. This corresponds with data indicating that similar maladaptive emotion regulation strategies, such as suppression and avoidance, are associated with more severe post-traumatic symptoms [29]. On the other hand, emergency call centre operators may not need to rely on such extensive emotion regulation strategies.

In the subsequent analyses, we aimed to determine the relationship between alexithymia, ruminations and PTSD. The observed relationships between alexithymia and ruminations were consistent with our predictions. Specifically, alexithymia was found to increase the likelihood of experiencing both intrusive and deliberate ruminations in both the paramedic group and the emergency call centre operator group. If we consider alexithymia to be of secondary nature, it is possible that paramedics employ a mechanism similar to dissociation [30].

The correlations between ruminations and PTSD obtained in this study are consistent with previous research conducted on paramedics [15, 16, 31-33]. This relationship is understandable, as it has traditionally been assumed that ruminations are a maladaptive form of regulating negative emotions [34]. Research has shown that ruminations serve as a prospective risk factor for the development of PTSD [35]. In the group of paramedics, both intrusive and deliberate ruminations were found to be associated with the intensity of all three components of PTSD. On the other hand, among emergency call centre operators, the correlations between both types of ruminations and hyperarousal were found to be non-significant. These correlations indirectly support the assumption that the job of an emergency call centre operator is less mentally burdensome.

The mediation model was significant only for paramedics. Alexithymia increases the likelihood of developing PTSD, as paramedics with alexithymia tend to engage in rumination. The most probable reason for this is that, as previous research has shown [15], one of the strategies that contribute to work-related stress and increase the likelihood of experiencing post-traumatic, depressive, and somatic symptoms is suppression. The act of suppressing emotional expression and the experience of negative emotions is similar to secondary alexithymia. Therefore, when this strategy is employed, it may trigger an ironic process or a “rebound effect” [36]. This “rebound effect” involves the uncontrolled intrusion of thoughts and feelings that were intentionally repressed through the mechanism of secondary alexithymia, often manifesting as ruminations. Indeed, in a study conducted on traumatised paramedics, suppression was found to be associated with more intrusions in the long term [35]. Therefore, secondary alexithymia can potentially lead to increased ruminations and accelerate the development of post-traumatic symptoms. From this perspective, the tendency to ruminate may be considered a prospective predictor for PTSD rather than solely trauma-related rumination.

One limitation of this study is the relatively small sample size in the compared groups of professions. The absence of emergency call centre operators who exhibit the described relationships in a highly symptomatic manner in this study may be attributed to factors such as their absence from work due to chronic psychosomatic disorders [37]. It would be interesting to monitor these relationships in the long term, as it would allow for the verification of concepts such as the relevance of secondary alexithymia.

CONCLUSIONS

Our results indicate significant differences in psychological variables, such as alexithymia, ruminations, and PTSD, among different occupational groups within the emergency services. Paramedics who have direct

contact with injured individuals are more likely to perceive their job as being filled with threats. On the other hand, emergency call centre operators have indirect contact and tend to view their job as a challenge. Considering paramedics, PTSD symptoms are intensified by ruminations, which, in turn, are probably the result of an ironic process that accompanies cutting off negative emotions. This mechanism is not observed within the group of emergency call centre operators. Further studies are needed to replicate our findings in larger samples and different groups. Moreover, longitudinal studies may provide valuable insight into a causal mechanism enriching observed associations.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures performed in the current study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later 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.

DISCLOSURE

The authors report no conflict of interest.

REFERENCES

- Phillips WJ, Cocks BF, Manthey C. Ambulance ramping predicts poor mental health of paramedics. *Psychol Trauma* 2022; 15 (Suppl 2): 305-314.
- Kucmin T, Kucmin A, Turska D, et al. Coping styles and dispositional optimism as predictors of post-traumatic stress disorder (PTSD) symptoms intensity in paramedics. *Psychiatr Pol* 2018; 52(3): 557-571.
- Eriksson M. Conceptions of emergency calls: emergency communication in an age of mobile communication and prevalence of anxiety. *J Contingencies Crisis Manag* 2010; 18(3): 165-174.
- Svensson M, Pesämaa O. How does a caller's anger, fear and sadness affect operators' Decision in emergency calls? *Int Rev Soc Psychol* 2018; 31: 1-7.
- Carmassi C, Gesi C, Corsi M, et al. Exploring PTSD in emergency operators of a major University Hospital in Italy: a preliminary report on the role of gender, age, and education. *Ann Gen Psychiatry* 2018; 17: 17.
- Wojciechowska M, Jasielska A, Ziarko M, et al. Mediating role of stress at work in the relationship of alexithymia and PTSD among emergency call operators. *Int J Environ Res Public Health* 2021; 18(23): 12830.
- Raport z funkcjonowania systemu powiadamiania ratunkowego [Report on the operation of the emergency notification system in 2016]. Available from: <https://www.gov.pl/web/mswia/raporty-z-funkcjonowania-systemu> (accessed: 15 June 2023).
- Departament Rynku Pracy. Ministerstwo Rodziny i Polityki Społecznej. Przewodnik po zawodach wyd. II [Labor Market Department, Ministry of Family and Social Policy. Guide to the competition, 2nd edition, volume II]. Available from: <http://psz.praca.gov.pl/-/180719-przewodnik-po-zawodach-wydanie-ii> (accessed: 15 June 2023).
- Kobelski G, Naylor, K, Ślusarz, R, Wysokiński M. Post-traumatic stress disorder among Polish healthcare staff in the era of the COVID-19 pandemic. *J Clin Med* 2023; 12(12): 4072.
- Petrie K, Milligan-Saville J, Gayed A, et al. Prevalence of PTSD and common mental disorders amongst ambulance personnel: a systematic review and meta-analysis. *Soc Psychiatry Psychiatr Epidemiol* 2018; 53(9): 897-909.
- Hoell A, Kourmpeli E, Dressing H. Work-related posttraumatic stress disorder in paramedics in comparison to data from the general population of working age. A systematic review and meta-analysis. *Front Public Health* 2023; 11: 1151248.
- Pearlman LA. Vicarious trauma. In: Figley CR (ed.). *Encyclopedia of trauma. An interdisciplinary guide*. Sage, Los Angeles 2012, p. 783-786.
- Courtois ChA. Complex trauma. In: Figley ChR (ed.). *Encyclopedia of trauma. An interdisciplinary guide*. Sage, Los Angeles 2012, p. 641-647.
- Figley CR. *Compassion fatigue: coping with secondary traumatic stress disorder in those who treat the traumatized*. Brunner/Mazel, New York 2004.
- Gärtner A, Behnke A, Conrad D, et al. Emotion regulation in rescue workers: differential relationship with perceived work-related stress and stress-related symptoms. *Front Psychol* 2019; 9: 2744.
- Ogińska-Bulik N. Dwa oblicza traumy. Negatywne i pozytywne skutki zdarzeń traumatycznych u pracowników służb ratowniczych [Two faces of trauma. Negative and positive effects of traumatic events in employees of emergency services]. Difin, Warszawa 2015.
- Regehr C. Bringing the trauma home: spouses of paramedics. *J Loss Traum* 2005; 10(2): 97-114.
- Boothroyd RA, Green S, Dougherty A. Evaluation of operation restore: a brief intervention for first responders exposed to traumatic events. *Traumatology* 2019; 25(3): 162-171.
- Jasielska A, Ziarko M. General and specific individual post-traumatic stress disorder-related mechanisms among paramedics. *Med Pr* 2019; 70(1): 53-66.
- Taylor GJ, Bagby RM, Parker JDA. *Disorders of affect regulation: alexithymia in medical and psychiatric illness*. Cambridge University Press, New York 1997.
- Messina A, Beadea JN, Paradiso S. Towards a classification of alexithymia: primary, secondary and organic. *J Psychopathol* 2014; 20: 38-49.
- Cann A, Calhoun LG, Tedeschi RG, Triplett KN. Assessing posttraumatic cognitive processes: the Event Related Rumination Inventory. *Anxiety Stress Coping* 2011; 24(2):137-156.
- Watkins Ed. Adaptive and maladaptive ruminative self-focus during emotional processing. *Behav Res Ther* 2004; 42(9): 1037-1052.
- Juczyński Z, Ogińska-Bulik N. Measurement of post-traumatic stress disorder – Polish version of Impact Event Scale-Revised. *Psychiatria* 2009; 6(1): 15-25.

25. Ścigała DK, Zdankiewicz-Ścigała E, Bedyńska S, Kokoszka A. Psychometric properties and configural invariance of the Polish – language version of the 20-item Toronto alexithymia scale in non-clinical and alcohol addict persons. *Front Psychol* 2020; 11: 1241.
26. Ogińska-Bulik N, Juczyński Z. Inwentarz Ruminacji o Negatywnym Zdarzeniu – Polska adaptacja the Event Related Rumination Inventory [Rumination Inventory about a Negative Event – Polish adaptation of the Event Related Rumination Inventory]. *P Psychol* 2015; 58(3): 383-400.
27. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods* 2008; 40(3): 879-891.
28. Milner A, Witt K, Maheen H, LaMontagne AD. Access to means of suicide, occupation and the risk of suicide: A national study over 12 years of coronial data. *BMC Psychiatry* 2017; 17(1): 125.
29. Shepherd L, Wild J. Emotion regulation, physiological arousal and PTSD symptoms in trauma-exposed individuals. *Journal J Behav Ther Exp Psychiatry* 2014; 45(3): 360-367.
30. Zdankiewicz-Ścigała E. Alexithymia and dissociation as the basic factors of posttraumatic phenomena. Wydawnictwo Naukowe Scholar, Warszawa, Poland, 2018.
31. Kirby R, Shakespeare-Finch J, Palk G. Adaptive and maladaptive coping strategies predict posttrauma outcomes in ambulance personnel. *Traumatology* 2011; 17(4): 25-34.
32. Ogińska-Bulik N, Juczyński Z. Ruminations as predictors of negative and positive effects of experienced traumatic events in medical rescue workers. *Med Pr* 2016; 67(2): 201-211.
33. Turliuc MN, Măirean C, Turliuc MD. Rumination and suppression as mediators of the relationship between dysfunctional beliefs and traumatic stress. *Int J Stress Manag* 2015; 22(3): 306-322.
34. Garnefski N, Kraaij V. Relationships between cognitive emotion regulation strategies and depressive symptoms: a comparative study of five specific samples. *Personal Individ Differ* 2006; 40(8):1659-1669.
35. Wild J, Smith KV, Thompson E, et al. A prospective study of pre-trauma risk factors for post-traumatic stress disorder and depression. *Psychol Med* 2016; 46(12): 2571-2582.
36. Wenzlaff RM. Mental control and depressive rumination. In: Papageorgiou C, Wells A (eds.). *Depressive rumination: nature, theory and treatment*. John Wiley & Sons Ltd, London 2004, p. 59-77.
37. Costa G. Factors influencing the health of workers and tolerance to shift work. *Theor Issues Ergon Sci* 2003; 4(3-4): 263-288.

AUTHORS' CONTRIBUTIONS

MW, AJ, MZ prepared research concept and design. MW, AJ, MZ, DP collected and analyzed data. MW, AJ wrote the article. All authors critically revised it and approved the final version of publication.