

Characteristic Impacts of Combat Stressors on Posttraumatic Stress Disorder in Ukrainian Military Personnel Who Participated in the Armed Conflict in Eastern Ukraine

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ABSTRACT

Posttraumatic Stress Disorder is a leading health problem among military personnel involved in armed conflicts. The current study identified and examined the influence of combat stressors leading to the development of Posttraumatic Stress Disorder in Ukrainian military personnel ($N=188$) who participated in the armed conflict in eastern Ukraine for a period of 4 to 16 months. The results showed that the leading combat stressors regarding Ukrainian service members' predisposition to PTSD were as follows: "witnessing someone get hit by incoming or outgoing rounds"; "being surrounded by the enemy"; "danger of being injured or killed, ambushed, in other very dangerous situations"; "corpses or blood"; "smells of gases, corpses, etc."; "stressors of family life"; "fear of a respondent's own death"; "inability to change a respondent's own living conditions"; "ruined buildings, machinery, structures, landscape"; "physical killing of an enemy"; "intense interpersonal conflicts"; "monotony of the surrounding conditions"; "stressors of a moral and ethical nature"; "dissatisfied biological and social needs"; and "long-term loads that cause fatigue." This study found a significant difference between Ukrainian military personnel's subjective perception of the power of a combat stressor and its real ability to cause Posttraumatic Stress Disorder symptoms. Those stressors that were subjectively evaluated by military personnel as more significant did not increase Posttraumatic Stress Disorder symptoms. These results may be useful for the prevention and treatment of Posttraumatic Stress Disorder in military personnel involved in armed conflicts.

Keywords: posttraumatic stress disorder, military personnel, combat stressors.

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Novelty and Significance

What is already known about the topic?

- Posttraumatic Stress Disorder is a leading cause of health problems among military personnel who have served in wars. The prevalence of Posttraumatic Stress Disorder in veterans can be up to 30%.
- There is not enough scientific evidence regarding which combat stressors have more or less influence on Posttraumatic Stress Disorder in military personnel involved in armed conflicts.

What this paper adds?

- This is the first study to determine the severity of various combat stressors that cause Posttraumatic Stress Disorder in Ukrainian military personnel involved in the armed conflict in eastern Ukraine.
- This study found for the first time a significant difference between military personnel's subjective perception of the power of a combat stressor and its real ability to cause Posttraumatic Stress Disorder symptoms.

Posttraumatic Stress Disorder (PTSD) is a pathological response to a traumatic event such as combat, a natural disaster, or a physical or sexual assault (Bomyea, Risbrough, & Lang, 2012). PTSD is an anxiety disorder that occurs after a traumatic

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event in which an individual experienced or witnessed a threat of serious injury or death and had a response involving intense fear, helplessness, or horror (Tanielian & Jaycox, 2008). Over the course of the past three decades, there has been an increased discussion of trauma and its effects, with particular focus on PTSD (Dami, James, Zubairu, Karick, & Dakwak, 2018). PTSD has received special attention because it is related to many negative health perceptions and outcomes (Rauch, Favorite, Giardino, Porcari, Defever, & Liberzon, 2010), results in significant social and economic burdens, and puts individuals at increased risk for physical and mental health difficulties, including depression and suicide (Bomyea et alia, 2012).

PTSD is a leading cause of health problems among military personnel who have served in wars where they have seen heavy combat (Shen, Arkes, & Pilgrim, 2009). Koven (2018) noted that many veterans without visible disabilities have acquired invisible scars that negatively affect them throughout their lifetimes and have severe repercussions for their families, friends, communities, and society at large. Other mental health disorders, divorce, alcoholism, drug abuse, homelessness, depression, unemployment, underemployment, and criminal acts represent some of the negative side effects of traumatic stress. Graham, Legarreta, North, DiMuzio, McGlade, & Yurgelun-Todd (2016) indicated that veterans with combat trauma were likely to experience diminished interest in, and detachment and estrangement from, others.

According to various researchers, the prevalence of PTSD in veterans can be up to 30%. Gates, Holowka, Vasterling, Keane, Marx, and Rosen (2012) found that the prevalence of PTSD in deployed U.S. military personnel may be as high as 14-16%. Various studies have reported the rate of PTSD among Operations Enduring Freedom and Iraqi Freedom veterans to be 23% (Fulton, Calhoun, Wagner, Schry, Hair, Feeling, Elbogen, & Beckham, 2015); 11-17% (Hoge, Castro, Messer, McGurk, Cotting, & Koffman, 2014); 21.8% (Seal, Metzler, Gima, Bertenthann, Maguen, & Marmar, 2009); and 13-15% (Lapierre, Schwegler, & Labauve, 2007). Ferrajão and Oliveira (2015) noted that 30% of Portuguese veterans suffered from chronic PTSD. Approximately 271,000 Vietnam veterans currently have full PTSD plus sub-threshold war zone PTSD. One-third of those currently have major depressive disorder -40 or more years after the war. As a result of these high rates of PTSD, mental health services for veterans with PTSD symptoms are likely to be necessary for many decades (Marmar, Schlenger, Henn-Haase, et alia, 2015). Furthermore, PTSD in military populations has a pervasive impact on military readiness and the accomplishment of military goals (Dami et alia, 2018).

Which stressors experienced by service members can cause PTSD? Stress escalates in times of political uncertainty, danger of war, and/or in geographical regions of permanent or unresolved conflict (Pinto, Griffiths, Weinstein, Demetrovics, & Szabo, 2019). An important risk factor for PTSD is combat exposure (Pietrzak, Whealin, Stotzer, Goldstein, & Southwick, 2011). Personnel who deploy in a combat role or have combat exposure are at higher risk of PTSD (Hines, Sundin, Rona, Wessely, & Fear, 2014); combat exposure is a particularly potent form of trauma which is associated with elevated rates of PTSD compared to other forms of trauma (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

The above is confirmed by many researchers. Sipos, Bar-Haim, Abend, Adler, and Blies (2014) found that soldiers who reported more combat exposure and showed intentional threat avoidance also reported higher levels of PTSD. Cesur, Sabia, and Tekin (2012) showed that frequent enemy firefights, wounds or injuries, and observing the death or wounding of a coalition member, ally, or non-combatant were associated with a substantially increased risk of suicidal thoughts and PTSD. The results of a study by Fontana, Rosenheck, and Brett (1992) demonstrated that having been a target of others' attempts to kill or injure was related more uniquely than any other role to symptoms that

are diagnostic criteria for PTSD. Henning and Frueh (1997) determined that severity of guilt regarding combat was positively correlated with the re-experiencing and avoidance symptoms of PTSD and functioned as a general measure of PTSD severity.

Paige, Renshaw, Allen, and Litz (2019) described four types of potentially traumatizing war zone experiences: committing a moral injury, observing a moral injury, threats to life, and traumatic loss. King, King, Gudanowski, and Vreven (1995), taking a somewhat different perspective, defined four indexes of war zone stressor experiences: traditional combat, atrocities or abusive violence, perceived threat, and malevolent environment. Nash, Marino Carper, Mills, Au, Goldsmith, and Litz (2013) emphasized that war zone experiences may lead to adverse psychological outcomes such as PTSD, not only because they expose individuals to life threat and loss, but also because they may involve experiences that contradict military personnel's deeply held moral and ethical beliefs and expectations.

Shen et alia (2009) confirmed the necessity of distinguishing combat stressors (seeing dead human bodies, being attacked or ambushed, and knowing someone who was seriously injured or killed) from operational stressors (having an uncertain redeployment date, long deployments, being separated from family, and lack of privacy).

Regarding the relationship between longer deployment and severity of PTSD Rona, Fear, Hull, Greenberg, Earnshaw, Hotopf, and Wessely (2007) found that personnel who had been deployed for 13 months or more in the previous three years were more likely to meet the criteria for PTSD. Those authors also showed that PTSD was associated with a mismatch between an individual's expectations about the duration of their deployment and the reality. Shen et alia (2009) reported that an individual's probability of screening positive for PTSD increased by 2.2 percentage points if that individual was deployed for longer than 180 days (for example, deployment to Iraq and Afghanistan). Castro and Adler (1999) identified certain relationships between longer deployments and previous deployment experiences in Bosnia: when operational tempo was defined as the length of a deployment, greater rates of psychological distress were associated with longer deployments. In contrast, psychological distress rates were lower when operational tempo was defined as previous deployment experience.

Kang et alia (2003) maintained that there was a significant relation between stressor intensity and PTSD among Gulf War veterans. However, Fajarito and Guzmán (2017) noted that there is still no consensus on specific trauma types and their corresponding PTSD symptom profiles. Thus, the analysis of possible stressors leading to PTSD in service members shows that the available evidence describes these stressors largely in a generalized form. Data regarding how strongly various combat stressors influence PTSD in military personnel are virtually nonexistent. However, such data can be very important in preventing and treating PTSD in military personnel involved in armed conflicts. This idea is supported by Pietrzak et alia (2011), who argued that examining the relationship between specific combat experiences and combat-related PTSD in veterans may help form etiologic models of PTSD and guide prevention and treatment approaches in this population. One of the few studies in this area is the work of Guyker, Donnelly, Donnelly et alia (2013), who emphasized that valid, reliable, and specific measurement is needed to broaden the existing knowledge of combat experiences in order to accurately answer clinically important questions regarding post-combat treatment and recovery. In particular, the authors tested the Combat Experiences Scale, which is the 33-item measure that assesses deployment-related experiences.

In general, the literature strongly supports the importance of research on the issue of PTSD in military personnel (Angkaw, Ross, Pittman, Kelada, Valencerina, & Baker, 2013; Hughes, Ulmer, Hastings, Gierisch, Mid-Atlantic VA MIRECC Workgroup, & Howard, 2018; Shen et alia, 2009). Gewirtz, Polusny, DeGarmo, Khaylis, and Erbes

(2010) also highlighted the importance of investigations and interventions to support parenting and couple adjustment among combat-affected families of service members. Jakupcak, Conybeare, Phelps, Hunt, Holmes, Felker, Klevens, and McFall (2007) argued for the necessity of screening for anger and aggression among veterans who exhibit symptoms of PTSD and incorporating relevant anger management treatments into early intervention strategies. As noted by Seal et alia (2009), targeted screening and early intervention with evidence-based treatments tailored to the problems of particular subgroups of veterans may be the best defense against chronic mental health and social and occupational problems. Similarly, Kang, Natelson, Mahan, Lee, and Murphy (2003). Post-traumatic stress disorder and chronic fatigue syndrome-like illness among Gul (2003) emphasized the necessity of screening for PTSD as part of post-deployment clinical examinations for troops returning from military conflicts. Dami et alia (2018), in a slightly broader sense, contended that there is a need for overall mental health assessment both before and after the deployment of military personnel to help in managing their distress.

It is also important to understand vulnerability and protective factors that contribute to or protect against the development of PTSD (Sheerin, Chowdhury, Lind, et alia, 2018). However, scientific data in this area are clearly lacking; only single and non-systematic studies on this subject are available. Thomassen, Hystad, Johnsen, Johnsen, and Bartone (2018) concluded that an avoidant-focused coping style acts as a vulnerability factor for PTSD symptoms, whereas hardiness acts as a resilience factor against the development of such symptoms. Sheerin et alia (2018) also confirm that avoidant coping, but no other coping strategy, was significantly positively related to PTSD diagnosis in the initial step. The same authors found that higher levels of negative self-beliefs were significantly associated with a PTSD diagnosis, while self-blame was associated with decreased likelihood of PTSD. Increased PTSD risk may also be attributable to certain forms of cognitive biases, i.e., negative attributions, rumination, negative appraisals, fear of emotion, and looming cognitive style (Bomyea et alia, 2012). Sung, Chang, Lee, and Park (2019) showed that cognitive flexibility may serve as a protective factor in the potential effects of stress on psychological adjustment, while Hughes et alia (2018) argued that qualities like psychological resilience may act as a buffer against negative psychological outcomes. Fajarito and Guzman (2017) argue that an important mediating factor in the emergence of PTSD among service members is the salience of military culture, such as the soldier's creed. Finally Browne, Hull, Horn, Jones, Murphy, Fear, Rona, Wessely, & Hotopf (2007) found that reservists were exposed to traumatic experiences at a higher rate than the regular forces.

Based on the above review of the relevant research, it is clear that there is a lack of scientific evidence regarding which combat stressors most strongly influence the emergence of PTSD in military personnel involved in armed conflicts, as well as vulnerability and protective factors for PTSD development. For the authors, as researchers of PTSD in Ukrainian military personnel who participated in the armed conflict in eastern Ukraine, this problem was compounded by the fact that this particular armed conflict, which has been ongoing since 2014, has numerous specific differences from armed conflicts that have occurred during recent decades in other countries. For this reason, the aim of the present study is to determine the list and weight of various combat stressors that cause the emergence of PTSD in Ukrainian military personnel who have participated in the armed conflict in eastern Ukraine. We believe that our study results will be of interest to researchers from various countries who are engaged in the issue of PTSD service members.

METHOD

Participants and Procedure

This study involved 188 Ukrainian service members who participated in the armed conflict in eastern Ukraine between May 2014 and February 2016 for periods ranging from 4 to 16 months. All participants were male. The age distribution of the sample was as follows: 37.8% (n= 71) were between 19 and 29 years old; 40.4% (n= 76) were between 30 and 39 years old; 36.7% (n= 37) were between 40 and 49 years old; and 2.1% (n= 4) were older than 50 years. Regarding distribution of military rank, 3.8% (n= 7) of participants were commissioned officers, 37.2% (n= 70) were non-commissioned officers, and 59% (n= 111) were soldiers.

The study was conducted during March and April 2016 at two military training centers located in regions remote from the armed conflict zone in eastern Ukraine. The diagnostic procedure was performed by scientist-psychologists from the Humanitarian Problem Research Centre of the Armed Forces of Ukraine. The studies were conducted with the approval of the General Staff of the Armed Forces of Ukraine and the participants' personal consent. The participants were informed that there were no right or wrong answers and were encouraged to respond candidly. Complete confidentiality was assured.

Measures

Combat Exposure Scale (CES; Keane, Fairbank, Caddell, Zimering, Taylor, & Mora, 1989).

The CES is a 7-item self-report measure that assesses wartime stressors experienced by combatants. The CES was developed to be easily administered and scored and is useful in both research and clinical settings. Items are rated on a 5-point frequency scale, ranging from no/never (1) to more than 50 times (5). Respondents are asked to reply based on their exposure to various combat situations, such as firing rounds at the enemy and being on dangerous duty. The total CES score is calculated by using a sum of weighted scores, which can be classified into one of five categories of combat exposure, ranging from "light" to "heavy". Cronbach's α for the total measure in the present sample was .76.

Combat Stressors Questionnaire. This questionnaire was developed by the authors were used to measure the intensity of combat stressors, is a 30-item self-report measure that assesses wartime stressors experienced by combatants. While developing this questionnaire, we focused on the creation and use of several similar combat stressor scales: the 33-item Combat Experiences Scale (Guyker *et alia*, 2013); the 18-item Combat Experiences Scale (Hoge *et alia*, 2004); the 37-item Different Combat Experiences Scale (Killgore, Cotting, Thomas, Cox, McGurk, Vo, Castro, & Hoge, 2008); and the 13-item short version of the Combat Experiences Scale (Kintzle, Barr, Corletto, & Castro, 2018). We developed our own questionnaire in order to take into account the specific combat stressors in the armed conflict area of eastern Ukraine studied here. Respondents were asked to respond based on their exposure to various combat stressors by ranking each stressor from 1 (individually least significant) to 30 (individually most significant). Cronbach's α for the total measure in the present sample was .93.

Short Screening Scale for DSM-IV PTSD (SSS-DSM-IVPTSD; Breslau, Peterson, Kessler, & Schultz, 1999). The SSS-DSM-IVPTSD is a 7-item self-report measure used to assess whether an individual who has experienced trauma: 1) avoided places, people, or activities associated with the trauma; 2) lost interest in important or enjoyable activities; 3) felt isolated or distant from others; 4) found it hard to have love or affection for others; 5) had a sense of a foreshortened future; 6) had sleep difficulties; and 7) became jumpy or easily startled. The scale is scored by counting the number of positive answers to these items. A score of 4 or higher seems to predict PTSD diagnosis.

Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997). The IES-R is a 22-item self-report scale that is used to measure an individual's subjective response to

traumatic events. The IES-R assesses the presence of three symptom clusters of PTSD: intrusion, avoidance, and hyperarousal. Participants indicate how much distress they experienced for each difficulty during the past week using a 5-item Likert-type scale, ranging from not at all (0) to “extremely” (4). Cronbach’s α for the total measure in the present sample was .90.

Mississippi Scale for Combat-Related PTSD (M-PTSD; Keane, Caddell, & Taylor, 1988). The M-PTSD is a 35-item self-report measure that assesses combat-related PTSD in veteran populations. The M-PTSD assesses standard PTSD symptoms as well as the associated features of depression, substance abuse, and suicidal tendencies. Respondents are asked to rate how they feel about each item using 5-point, Likert-style response categories, ranging from not at all true (1) to extremely true (5). Ten positively framed items are reverse scored. Responses are then summed to provide an index of PTSD symptom severity, which can range from 35 to 175. Cronbach’s α for the total measure in the present sample was .82.

Data Analysis

SPSS version 22.0.0.0 was used for statistical analysis. Preliminary analyses included descriptive statistics. Spearman’s rank correlation coefficient was used to determine the list and weight of the various combat stressors leading to PTSD in the studied sample.

RESULTS

Table 1 presents the combat experiences of the Ukrainian military personnel who participated in this study. Our data indicate that the service members in this sample were significantly affected by combat stressors. Of the total sample, 41% performed tasks in high-risk conditions (military watch, etc.) more than 50 times, and another 33% performed such tasks between four and 50 times. Over half (52%) of respondents had been in an area experiencing enemy attacks for more than 4 months; 28% had experienced being surrounded by the enemy; 60% were in military units which experienced combat loss; 71% had experienced being under enemy fire; 51% had witnessed death or injuries in combat; and 70% had been at risk of being killed or injured, were ambushed, or experienced other very dangerous situations.

Considering these indicators of the combat experience of the military personnel in our sample, it is unsurprising that 38 out of 188 participants (20.2%) scored 4 or higher on the SSS-DSM-IVPTSD, which is considered a cut-off for predicting PTSD diagnosis.

Table 1. Combat Experiences of Service Members.

	Combat experience indicators					
	Never	1-3 times	4-12 times	13-50 times	More than 50 times	
1. Did you ever go on combat patrols or have other dangerous duty?	14%	12%	16%	17%	41%	More than 50 times
2. Were you ever under enemy fire?	21%	Less than 1 month	1-3 months	4-6 months	34%	More than 6 months
3. Were you ever surrounded by the enemy?	72%	12%	9%	4%	3%	More than 50 times
4. What percent of the people in your unit were killed, wounded, or missing in action?	None	1-25%	26-50%	51-75%	75%	More than 75%
5. How often did you fire rounds at the enemy?	40%	49%	8%	2%	1%	More than 50 times
6. How often did you see someone get hit by incoming or outgoing rounds?	29%	13%	18%	15%	25%	More than 50 times
7. How often were you in danger of being injured or killed (bullets, shells, melee weapons), ambushed, or in other very dangerous situations in the line of duty?	49%	18%	20%	10%	3%	More than 50 times
	30%	20%	18%	14%	18%	More than 50 times

Table 2. Military Personnel's Ranking of Combat Stressors by Influence.

Combat Stressors	<i>M</i>	<i>SD</i>
1. Captivated service members from a respondent's own unit.	23.9	8.3
2. Command errors.	22.2	9.7
3. Death of civilians or service members from a respondent's own unit.	22.0	9.5
4. Fear of captivity	21.4	9.8
5. Situations that threaten life and physical health	20.3	10.2
6. Injuries, concussions, mutilations	19.8	11.0
7. Fear of a respondent's own death	19.4	10.1
8. Terrifying pictures of death, human losses, and suffering	18.5	10.3
9. Events destroying a respondent's honor and dignity	17.8	11.4
10. A large number of injured people	17.2	10.4
11. Sexual disharmony	17.2	10.9
12. Poor sanitary conditions	17.0	9.9
13. Dissatisfied material needs	17.0	10.1
14. Long-term highly stressful work, increased responsibility for actions	16.9	9.7
15. Stressors of a moral and ethical nature (remorse, responsibility for civilians' lives, the need to use weapons and other destructive means)	16.5	10.0
16. Experience of unsuccessful actions (miscalculated situations, mistakes in movements, etc.)	16.5	9.9
17. The necessity to process a lot of information and make decisions	16.1	9.8
18. Stressors of family life	15.5	10.7
19. Smells of gases, corpses, etc.	15.4	10.5
20. Long-term loads that cause fatigue	15.4	9.5
21. Monotony of the surrounding conditions	15.4	10.0
22. Physical killing of an enemy (especially for the first time)	15.3	11.7
23. Dissatisfied biological and social needs	15.2	9.9
24. Sudden, unexpected changes in the service terms	15.1	10.2
25. Inability to change a respondent's own living conditions	15.0	10.4
26. The need to constantly fulfill commanders' orders	14.7	10.1
27. Corpses or blood	14.6	11.0
28. Explosions, buzzing, roaring, crashing, shooting	12.8	10.3
29. Ruined buildings, machinery, structures, landscape	12.0	10.6
30. Intense interpersonal conflicts	12.0	9.4

The military personnel's ranking of 30 combat stressors by intensity of impact (the "Combat Stressors" questionnaire) are presented in Table 2. The following eight combat stressors were determined to be comparably the most stressful ($M= 18.5$ to 23.9 at the 30-point maximum): "captivated service members from a respondent's own unit"; "command errors"; "deaths of civilians, or service members from a respondent's own unit"; "fear of captivity"; "situations that threaten life and physical health"; "injuries, concussions, mutilations"; "fears of a respondent's own death"; and "terrifying pictures of death, human losses and suffering".

The following stressors were also quite strong ($M= 16.9$ to 17.8): "events destroying a respondent's honor and dignity"; "a large number of injured people"; "sexual disharmony"; "poor sanitary conditions"; "dissatisfied material needs"; and "long-term highly stressful work, increased responsibility for actions." The relatively least influential stressors ($M= 12.0$ to 12.8) included: "explosions, buzzing, roaring, crashing, shooting"; "ruined buildings, equipment, structures, landscape"; and "intense interpersonal conflicts."

Table 3 presents the correlations between the severity of combat stressors in the CES and PTSD symptoms. The following were the three strongest combat stressors from the seven indicators of the CES that had reliable correlations with PTSD symptoms according to all three techniques used: 1) witnessing someone get hit by incoming or outgoing rounds ($r= .23$ to $.32$; $p < .01/.001$); 2) being surrounded by the enemy ($r= .17$ to $.31$; $p < .05/.001$); and 3) danger of being injured or killed, ambushed, or encountering other very dangerous situations in the line of duty ($r= .17$ to $.24$; $p < .05/.001$). Other combat stressors had a weaker influence on whether a participant developed PTSD.

The correlations between the severity of combat stressors (as determined by the "Combat Stressors" questionnaire) and PTSD symptoms are presented in Table 4. All five PTSD symptoms were correlated with 10 of 30 combat stressors. Another 14 combat stressors were correlated with two to four PTSD symptoms, while only six did not correlate significantly with any PTSD symptom.

Table 3. Correlations Between Severity of Combat Stressors and PTSD symptoms.

Indicators of the Combat Exposure Scale	PTSD symptoms				
	SSS-DSM-IV PTSD	IES-R (intrusion)	IES-R (avoidance)	IES-R (hyperarousal)	M- PTSD
	1	2	3	4	5
1. The experience of going on combat patrols or having other dangerous duty.	.01	.15*	.11	.13	.12
2. The experience of being under enemy fire.	.04	.21**	.11	.14*	.06
3. The experience of being surrounded by the enemy.	.25***	.31***	.17*	.24***	.29***
4. People in a respondent's unit were killed, wounded, or missing in action.	.15*	.17*	.07	.09	.10
5. The experience of firing to the enemy.	.12	.15*	.06	.07	.07
6. The experience of witnessing of someone get hit by incoming or outgoing rounds.	.27***	.32***	.24***	.24***	.23***
7. Danger of being injured or killed (bullets, shells, melee weapons), ambushed, in other very dangerous situations in the line of duty.	.17*	.24***	.14*	.21**	.17*

Notes: * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Table 4. Correlations Between Severity of Combat Stressors ("Combat Stressors" Questionnaire) and PTSD Symptoms.

Indicators of "Combat Stressors" questionnaire	PTSD symptoms				
	SSS- DSM-IV PTSD	IES-R (intrusion)	IES-R (avoidance)	IES-R (hyperarousal)	M- PTSD
	1	2	3	4	5
1. Captivated service members from a respondent's own unit.	-.01	.01	-.02	.04	-.01
2. Command errors.	.04	-.05	-.05	.03	.03
3. Death of civilians or service members from a respondent's own unit.	.08	.15*	.09	.14*	.11
4. Fear of captivity.	.08	.11	.04	.07	.06
5. Situations that threaten life and physical health.	.02	.06	.01	.06	.10
6. Injures, concussions, mutilations.	-.06	.06	.09	.08	.04
7. Fear of a respondent's own death.	.14*	.27***	.29***	.30***	.25***
8. Terrifying pictures of death, human losses, and suffering.	.09	.14*	.06	.14*	.08
9. Events destroying a respondent's honor and dignity.	.07	.18*	.16*	.15*	.10
10. A large number of injured people.	.09	.12	.11	.15*	.19**
11. Sexual disharmony.	.14*	.13	.09	.19**	.20**
12. Poor sanitary conditions.	.11	.17*	.13	.14*	.14*
13. Dissatisfied material needs.	.14*	.12	.16*	.12	.16*
14. Long-term highly stressful work, increased responsibility for actions.	.16*	.17*	.16*	.16*	.14*
15. Stressors of a moral and ethical nature (remorse, responsibility for civilians' lives, the need to use weapons and other destructive means).	.21**	.23**	.22**	.18*	.18*
16. Experience of unsuccessful actions (miscellaneous situations, mistakes in movements, etc.)	.12	.16*	.07	.19**	.15*
17. The necessity to process a lot of information and make decisions	.15*	.17*	.18*	.15*	.12
18. Stressors of family life	.18*	.26***	.18*	.31***	.33***
19. Smells of gases, corpses, etc.	.23**	.28***	.19**	.27***	.30***
20. Long-term loads that cause fatigue	.12	.16*	.16*	.23***	.25***
21. Monotony of the surrounding conditions	.19**	.22**	.22**	.20**	.19**
22. Physical killing of an enemy (especially for the first time)	.19**	.23**	.22**	.27***	.20**
23. Dissatisfied biological and social needs	.13	.20**	.19**	.26***	.19**
24. Sudden, unexpected changes in the service terms	.02	.10	.10	.15	.14
25. Inability to change a respondent's own living conditions	.13	.24***	.27***	.24***	.27***
26. The need to constantly fulfill commanders' orders	.05	.20**	.23**	.22**	.14*
27. Corpses or blood	.17*	.30***	.25***	.35***	.28***
28. Explosions, buzzing, roaring, crashing, shooting	.12	.14*	.08	.21**	.25**
29. Ruined buildings, machinery, structures, landscape	.19**	.19**	.20**	.27***	.26***
30. Intense interpersonal conflicts	.17*	.14*	.19**	.25***	.27***

Notes: * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Interestingly, the top 10 most influential combat stressors as ranked by military personnel (Table 2) showed the least correlation with PTSD symptoms, with the exception

of the “fear of a respondent’s own death” indicator. In other words, there was a significant difference between service members’ subjective perception of a combat stressor and its real ability to cause PTSD symptoms in those service members. For example, the top two stressors according to service members were “captivated service members from a respondent’s own unit” and “command errors.” Given that such stressors do not lead directly to traumas, it is not surprising, in our view, that there were not significant correlations between these combat stressors and PTSD symptoms. However, the combat stressor of “corpses, blood,” which was related most closely to PTSD symptoms, was ranked only 27th out of 30 stressors by military personnel.

Overall, there were 12 combat stressors that predisposed participants most strongly to PTSD (defined as correlation coefficients of 0.92 to 1.35 for five PTSD symptoms). These are as follows, in order of importance: 1) “corpses or blood”; 2) “smells of gases, corpses, etc.”; 3) “stressors of family life”; 4) “fear of a respondent’s own death”; 5) “inability to change a respondent’s own living conditions”; 6) “ruined buildings, machinery, structures, landscape”; 7) “physical killing of an enemy (especially, for the first time)”; 8) “intense interpersonal conflicts”; 9) “monotony of the surrounding conditions”; 10) “stressors of a moral and ethical nature (remorse, responsibility for civilians’ lives, the need to use weapons and other destructive means)”; 11) “dissatisfied biological and social needs”; and 12) “long-term loads that cause fatigue.”

The following five combat stressors were virtually unrelated to PTSD occurrence (i.e., the sums of the correlation coefficients for the five PTSD symptoms were 0.00 to 0.36): 1) “command errors”; 2) “captivated service members from a respondent’s own unit”; 3) “injuries, concussions, mutilations”; 4) “situations that threaten life and physical health”; and 5) “fear of captivity.”

In the context of these results, we should note the overall consistency of the obtained correlation coefficients between combat stressors and the five PTSD symptoms, obtained via three different methods. That said, the SSS- DSM-IVPTSD had slightly lower correlations.

DISCUSSION

In accordance with the main objective of our study, we conducted research with 188 service members who participated in the armed conflict in eastern Ukraine who had significant combat experiences and were significantly affected by combat stressors. Of these, 20.2% had a predictive PTSD diagnosis according to the Short Screening Scale for DSM-IV PTSD, which is generally consistent with PTSD occurrence in veterans (Fulton *et alia*, 2015; Gates *et alia*, 2012; Hoge *et alia*, 2014; Lapierre *et alia*, 2007; Seal *et alia*, 2009). However, in this context, we should note first that PTSD diagnosis and occurrence among Ukrainian military personnel who participated in the armed conflict in eastern Ukraine was not our study objective. Furthermore, the number of service members with a probable PTSD diagnosis as estimated here is far from conclusive, since our sample did not include those service members who were injured in combat.

The correlations between combat stressors and the five PTSD symptoms obtained via three different methods are sufficiently consistent. The study results show that PTSD in Ukrainian military personnel because of their combat experience (per the CES) is caused mainly by such combat stressors as the experience “of witnessing of someone get hit by incoming or outgoing rounds,” “being surrounded by the enemy,” and experiencing “danger of being injured or killed, ambushed, or other very dangerous situations in the line of duty.” According to participants’ subjective evaluation of various combat stressors (per the “Combat Stressors” questionnaire), the most likely causes of PTSD are the following: “corpses or blood”; “smells of gases, corpses, etc.”; “stressors

of family life”; “fear of a respondent’s own death”; “inability to change a respondent’s own living conditions”; “ruined buildings, machinery, structures, landscape”; “physical killing of an enemy (especially, for the first time)”; “intense interpersonal conflicts”; “monotony of the surrounding conditions”; “stressors of a moral and ethical nature (remorse, responsibility for civilians’ lives, the necessity to use weapons and other destructing means)”; “dissatisfied biological and social needs”; and “long-term loads that cause fatigue.” In our view, it is natural enough that combat stressors of the first group are fully consistent in content with those included in the second group.

The results obtained are, in general, also consistent with previous data: Sipos *et alia* (2014), who determined that soldiers with higher combat exposure reported higher levels of PTSD; Paige *et alia* (2019), who regard committing a moral injury, observing a moral injury, threats to life, and traumatic loss as traumatizing war zone experiences; Henning and Frueh (1997), who found that severity of guilt regarding combat was positively correlated with the re-experiencing and avoidance symptoms of PTSD and was a general measure of PTSD severity; and Pietrzak *et alia* (2011), who showed that personally witnessing someone from one’s unit or an ally unit being seriously wounded or killed is a combat experience associated with severity of combat-related PTSD symptoms. However, in this study, we have defined a clear, rather than general, list and quantitative weight of various combat stressors that cause certain PTSD symptoms in Ukrainian service members participating in the armed conflict in eastern Ukraine.

We also established that there was a significant difference between Ukrainian military personnel’s subjective perception of the power of a combat stressor and its real ability to cause PTSD symptoms. Those stressors that were subjectively evaluated by military personnel as more significant did not give rise to PTSD symptoms. Undoubtedly, this finding -of which we have not found analogues in other research- requires further clarification and verification.

The limitations of our study are determined by several factors unique to this research. First, most of the Ukrainian service members who participated in combat between 2014 and 2016 had no previous combat experience or a high level of combat training. Second, the armed conflict in eastern Ukraine had an active phase from May to September 2014 with large-scale hostilities and heavy human losses, but then moved to a “frozen” state of conditional ceasefire with an unpredictable end result and an unpredictable time of this result. During the second period, deaths and injuries of Ukrainian service members continued, but were less frequent. Third, the research organization; the sample did not include service members who were injured during the fighting.

Despite these limitations, the present study’s findings expand our understanding of which, and to what extent, combat stressors may cause certain PTSD symptoms to occur in military personnel. These data may be useful for PTSD prevention and treatment in military personnel involved in armed conflicts, and they suggest multiple avenues for future research.

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