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Psychological consequences of war as a real threat to young people with post-traumatic stress disorder

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ABSTRACT

Introduction and aim. The consequences of Russia's invasion of Ukraine have led to a violation of the mental health of youth, children, and adults in Ukraine. Increased cases of mental disorders related to war trauma, including post-traumatic stress disorder (PTSD) due to violence, loss of family and friends, loss of normal life, fear, uncertainty, and constant stress, are leading to long-term PTSD, which can negatively affect their quality of life, such as physical, mental, and social well-being. Determination of symptoms of PTSD in students (men and women) of medical and technical higher education institutions during the war in Ukraine.

Material and methods. At the beginning of 2024, the survey was attended by 452 students of Ukrainian higher education institutions (medical and technical), of which 24.6% were male and 75.4% were female, aged 15–19 (65.8%), aged 20–28 (21.1%), and over 29 (13.1%). The methodology 'Identification of potentially traumatic events in life among applicants' was used to identify students with signs of PTSD out of a total of 452 surveyed students. The next step was to assess the degree of PTSD symptoms in 121 students of the total number of students who were identified as having PTSD symptoms using the 'PTSD

symptoms list'. Research was conducted with the help of the STATISTICS program, by the Pearson's Chi-square method, Spearman's rank correlation coefficient (r_s).

Results. The severity of the consequences of the war was assessed based on the results of a survey among students of higher education institutions during the hostilities in Ukraine. Students who participated in hostilities or were in the war zone represented 45.9% of respondents from technical universities (TU) and 24.8% of the respondents from medical universities (MU). Students who experienced sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats) made up 18.9% of the students in the TU and 16.9% in the MU.

Conclusion. Sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats) among students in higher education institutions was experienced by 18.9% of respondents of technical specialization and 16.9% of respondents of medical specialization. The identified unfavorable features of students' mental health during hostilities may lead to long-term negative consequences in the future. Particular attention should be paid to risk groups, including female students.

Keywords. Full-scale war, posttraumatic stress disorder, students of higher education institutions of technical and medical profile

Introduction

The Russian invasion of Ukraine since 2014 has caused a sudden increase in the number of vulnerable people exposed to war and other traumatic events. Loss of family and friends, violence, internal displacement, loss of personal housing, and jobs can lead to an increase in cases of mental disorders, depression, anxiety, and post-traumatic stress disorder (PTSD) among the Ukrainian population, especially among youth and children. Constant stress, fear, and uncertainty contribute to long-term consequences and impede the reconstruction of Ukraine. Kisarchuk found that out of 30% of people suffering from PTSD as a result of military actions, 20.0% need specialized help because they cannot overcome this disorder on their own.^{1,2}

Young people around the world are particularly sensitive to military conflicts, and research of the consequences of their cognitive, emotional, and behavioral disorders is important. Living in war zones or under constant bombardment can create or exacerbate the risk of direct and indirect impacts on the physical, psychological/mental health of young people and negatively affect their physical, mental and social well-being. The negative effects of hostilities and migration are often manifested in the high prevalence of depression, anxiety disorders, and PTSD. Among adolescents aged 15–17 years who were traumatized by military operations, 53.7% were diagnosed with PTSD.³⁻⁵

According to global scientific data, the prevalence of PTSD among people who have suffered the consequences of severe psychotraumatic trauma, have been a combatant, a victim of violence, or have been

in occupation or captivity (severe physical and psychological abuse, assassination attempts, murder, rape, etc.) reaches 100%.

Thus, according to scientific data, negative psychophysiological changes in the mental/mental health of trauma survivors were observed in 56.0% of people and minor symptoms due to trauma were observed in 44% of people. According to foreign researchers, the prevalence of PTSD among the world's population in recent years has ranged from 9% to 12%.^{6,7}

Young people affected by war are a particularly vulnerable group for experiencing trauma and developing mental/mental health disorders. According to the results of studies, the indicators of PTSD criteria are high: 71.6% of adolescents had disorders in the emotional and volitional sphere; 62.9% of adolescents had disorders in the behavioral sphere, and the coefficient of academic performance, which characterizes cognitive disorders, is 25.1%.⁸

Aim

Therefore, the aim of the study was to investigate the initial signs of mental/mental health disorders and the diagnosis of posttraumatic stress disorder in students of higher education institutions of medical and technical specialization during the war in Ukraine.

Material and methods

At the beginning of 2024, the survey was attended by 452 students of Ukrainian higher education institutions (medical and technical), of which 24.6% were male and 75.4% were female, aged 15–19 (65.8%), aged 20–28 (21.1%), and over 29 (13.1%). The methodology ‘Identification of potentially traumatic events in life among applicants’ was used to identify students with signs of PTSD out of a total of 452 surveyed students. The next step was to assess the degree of PTSD symptoms in 121 students out of the total number of students who were identified as having PTSD symptoms using the “ Checklist of PTSD symptoms.”

Stage 1 – involved identifying signs of PTSD using the methodology «Identification of potentially traumatic events in life among applicants» among students of Vinnytsia National Medical University named after M.I. Pirogov. Pirogov Vinnytsia National Medical University (VNMU), Zaporizhzhia State Medical and Pharmaceutical University and students of Vinnytsia National Technical University (VNTU), Taras Shevchenko National University of Kyiv, of whom 24.6% were men and 75.4% were females, 65.8% were 15–19 years, 21.1% were aged 20–28, and 13.1% were over 29 years old.

Stage 2 included assessment of PTSD symptoms using the PCL-5 PTSD Symptom Checklist, which met the DSM-5 criteria for PTSD. The survey involved 121 applicants, of whom 19.0% were men and 81.0% were females, 44.6% were under 15–19 years old, 53.7% were over 20–28 years old and 1.7% were over 29 years old. The research was conducted with the help of STATISTICS program (Statsoft, Tulsa, OK, USA),

using the Pearson Chi-square method and Spearman rank correlation coefficient (r_s). The quantitative values obtained from the questionnaire do not follow a normal distribution, so comparisons and relationships between them could not be calculated using parametric criteria (Student's, Fisher's). The most adequate method of analysis in this case is the non-parametric Whitney-Wilcoxon-Mann test or Pearson's chi-square test. The study has been approved by the Bioethics Committee of the University No 2023/09/01.

Results

According to our study, 48.6% of the students of technical universities and 32.8% of the students of medical universities witnessed a fire or explosion during the hostilities. 27.0% of the TU students witnessed traffic accidents and 22.4% of the MU students, while 24.3% and 26.8% were directly involved in the events. During hostilities, 16.2% of TU students witnessed armed attacks and were in the combat zone, and 7.4% of MU students also witnessed armed attacks, while 5.9% of students were directly involved in the combat zone. According to TU survey, 27.0% of the students of the TU and 10.4% of the students of the MU witnessed severe suffering. Witnessing a sudden death among the TU students was 16.2% and 9.9% among the students of the MU (Table 1).

Table 1. Identification of Potentially Traumatic Events in the Life of Students of Higher Education Institutions of Ukraine by the Methodology ‘Identification of Potentially Traumatic Events in the Life of Students’, ($P \pm S_p$) %

Question	Medical professional institutions (MPIs)		Educational institutions of technical profiles (ETPs)	
	Witness	Participant	Witness	Participant
Natural disaster (flood, hurricane, earthquake)	8.9±2	7.4±1.9	10.8±5.1	10.8±5.1
Fire or explosion	32.8±3.3	18.4±2.7	48.6±8.2	29.7±7.5
Transport accident (road traffic accident, plane crash, train accident)	22.4±2.9	26.8±3.1	27.0±7.3	24.3±7
A serious accident at work, at home or while on holiday	9.4±2	4.4±1.5	–	10.8±5.1
Poisoning by toxic substances (including radiation)	–	10.9±2.2	–	10.8±5.1
Physical violence (e.g. being attacked, hit with a hand, object, kicked, beaten)	8.9±2	44.7±3.5	8.1±4.4	37.8±7.9

Armed assault (e.g., you were shot at, stabbed, threatened with a knife, gun, explosives)	7.4±1.8	5.9±1.6	16.2±6	–
Sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats of harm)	–	16.9±2.6	5.4±3.7	18.9±6.4
Other unwanted or unpleasant sexual experiences	–	25.8±3	–	13.5±5.6
Combat operations or stay in a war zone (as a military or civilian)	7.4±1.8	24.8±3	16.2±6	45.9±8.1
Captivity (e.g., as a result of kidnapping or capture, as a hostage or prisoner of war)	5.5±1	–	–	–
Life-threatening illness or injury	7.5±1.8	23.8±3	18.9±6.4	27±7.3
Severe suffering	10.4±2.1	23.4±2.9	27.0±7.3	24.3±7
Sudden violent death (e.g. murder, suicide)	7±1.7	–	10.8±5.1	5.4±3.7
Sudden death as a result of an accident	9.9±2.1	–	16.2±6	–
Serious injury or death caused by you to someone else	1.5±0.8	5.4±1.6	2.7±2.6	–

Among the students of the TU institutions, 45.9% of respondents were direct participants in hostilities or were in the war zone, and 24.8% of the MUs. 29.7% of the students of TU and 18.4% students of MU witnessed fire or explosions. 44.7% of the students in the TU and 37.8% of students in the MU experienced physical violence. Sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats) was experienced by 18.9% of the students in the TU and 16.9% of the students in the MU. According to the results of our research on the gender peculiarities of traumatic events in the lives from students of Ukrainian higher education institutions, a high rate of 47.7% of male survivors of physical violence was found in the role of participant/victim compared to 42.8% of female survivors. Female students of higher education institutions 30.4% were in the combat zone and male students 18.2%. As participants, 26.8% of female students and 11.4% of male students of Ukrainian higher education institutions had unwanted or unpleasant sexual experiences. 23.2% of the female students and 22.7% of male students (Table 2).

Table 2. Identification of Potentially Traumatic Events in the Life of Students of Higher Education Institutions of Ukraine by the Methodology ‘Identification of Potentially Traumatic Events in the Life of Students’, ($P \pm S_p$) %

Question	Male persons		Female persons	
	Witness	Participant	Witness	Participant
Natural disaster (flood, hurricane, earthquake)	9.0±4.3	–	9.3±2	9.3±2
Fire or explosion	29.5±6.8	18.2±5.8	36.6±3.4	20.6±2.9
Transport accident (road traffic accident, plane crash, train accident)	22.7±6.3	27.3±6.7	23.2±3	26.3±3.1
A serious accident at work, at home or while on holiday	13.6±5.1	6.8±3.7	7.2±1.8	5.2±1.5
Poisoning by toxic substances (including radiation)	6.8±3.7	13.6±5.1	2.1±1	10.3±2.1
Physical violence (e.g. being attacked, hit with a hand, object, kicked, beaten)	11.4±4.7	47.7±7.5	8.2±1.9	42.8±3.6
Armed assault (e.g., you were shot at, stabbed, threatened with a knife, gun, explosives)	11.4±4.7	6.8±3.7	8.2±1.9	5.2±1.5
Sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats of harm)	–	–	3.1±1.2	20.1±2.8
Other unwanted or unpleasant sexual experiences	–	11.4±4.7	–	26.8±3.1
Combat operations or stay in a war zone (as a military or civilian)	11.4±4.7	18.2±5.8	8.2±1.9	30.4±3.3
Captivity (e.g., as a result of kidnapping or capture, as a hostage or prisoner of war)	–	–	–	–
Life-threatening illness or injury	6.8±3.7	29.5±6.8	9.8±2.1	23.2±3
Severe suffering	13.6±5.1	22.7±6.3	12.8±2.4	23.7±3
Sudden violent death (e.g. murder, suicide)	9.1±4.3	–	7.2±1.8	–
Sudden death as a result of an accident	11.4±4.7	6.8±3.7	10.8±2.2	–
Serious injury or death caused by you to someone else	–	13.6±5.1	–	–

Regarding changes in gender characteristics, the study found that they were predictive of most PTSD symptoms. To the greatest extent ($p < 0.001$), this was true for the following issues: “During the month, have you been disturbed by repeated, disturbing and unwanted memories of stressful experiences?” 23.04 ($p < 0.001$), “Feeling of constant tension?” 20.52 ($p < 0.001$), “Feeling upset when something reminds you of a stressful experience?” 19.26 ($p < 0.001$), Strong physical reactions when something reminded you of a stressful experience (eg heartbeat, palpitations 17.72 ($p < 0.001$)) (Table 3).

Table 3. Comparison of gender peculiarities in the study of PTSD symptoms of Ukrainian university students (comparison by Pearson's Xi- square (χ^2) and Mann-Whitney (U))

Question	χ^2	p	U	p
During the past month, have you been bothered by recurring, disturbing, and unwanted memories of stressful experiences?	23.04	<0.001	19459.5	<0.05
Recurring and disturbing dreams about stressful experiences?	14.99	0.005	21129	<0.05
Sudden feelings or events as if the stressful experience is happening again?	11.19	0.024	21734.5	<0.05
Feeling upset when something reminds you of a stressful experience?	19.26	0.001	20539.5	<0.05
Strong physical reactions when something reminded you of the stressful experience (e.g., heart palpitations, difficulty breathing)?	17.72	0.001	20977.5	<0.05
Avoidance of memories, thoughts, or feelings associated with the stressful experience?	10.22	0.037	23622	>0.05
Avoidance of external stimuli (people, objects, places, etc.) that remind you of the stressful experience?	1.72	>0.05	25307.5	>0.05
Have trouble remembering important moments from a stressful experience?	8.82	>0.05	22598.5	<0.05
Strong negative beliefs about yourself, other people, or the world around you (e.g., "I'm bad")	5.28	>0.05	25051.5	>0.05
Self-blame or blame others for the stressful experience or what happened afterwards?	2.88	>0.05	24382.5	>0.05
Strong negative emotions such as fear, terror, anger, guilt, or shame?	11.02	>0.05	22424	<0.05
Loss of interest in the activity(s) that used to bring pleasure?	1.81	>0.05	25065.5	>0.05
A sense of remoteness or separation from others?	4.34	>0.05	23555	<0.05

Problems in experiencing positive emotions (eg, inability to feel joy or love)	2.31	>0.05	24961	>0.05
Irritation, outbursts of anger, aggressive behavior?	9.49	0.05	22986	<0.05
Are you take risks or do things that could be harmful?	11.95	0.018	25356.5	>0.05
To be "on the alert" or "on the lookout"?	3.98	>0.05	23978.5	>0.05
A feeling of constant tension?	20.52	<0.001	19786	<0.05
Difficulty concentrating?	4.47	>0.05	23908	>0.05
Have trouble falling asleep or waking up at night?	13.9	0.008	23119	<0.05

Table 4 shows the results of the evaluation of age-related characteristics for manifestations of PTSD.

Table 4. Age Peculiarities in the Study of PTSD Symptoms of Ukrainian Higher Education Students, (comparison by Pearson's Chi- square (χ^2), Spearman's rank correlation coefficient (r_s))

Question	χ^2	p	r_s	p
During the past month, have you been bothered by recurring, disturbing, and unwanted memories of stressful experiences?	14.394	>0.05	-0.015	0.738
Recurring and disturbing dreams about stressful experiences?	10.255	>0.05	0.1	0.022
Sudden feelings or events as if the stressful experience is happening again?	14.935	>0.05	-0.051	>0.05
Feeling upset when something reminds you of a stressful experience?	7.9	>0.05	0.049	>0.05
Strong physical reactions when something reminded you of the stressful experience (e.g., heart palpitations, difficulty breathing)?	8.992	>0.05	0.028	>0.05
Avoidance of memories, thoughts, or feelings associated with the stressful experience?	14.212	>0.05	-0.015	>0.05
Avoidance of external stimuli (people, objects, places, etc.) that remind you of the stressful experience?	8.575	>0.05	0.065	>0.05
Have trouble remembering important moments from a stressful experience?	7.558	>0.05	-0.016	>0.05
Strong negative beliefs about yourself, other people, or the world around you (e.g., "I'm bad")	10.865	>0.05	0.046	>0.05
Self-blame or blame others for the stressful experience or what happened afterwards?	5.991	>0.05	0.009	>0.05
Strong negative emotions such as fear, terror, anger, guilt, or shame?	11.885	>0.05	0.031	>0.05

Loss of interest in the activity(s) that used to bring pleasure?	4.627	>0.05	0.05	>0.05
A sense of remoteness or separation from others?	9.066	>0.05	0.062	>0.05
Problems in experiencing positive emotions (eg, inability to feel joy or love)	4.811	>0.05	0.032	>0.05
Irritation, outbursts of anger, aggressive behavior?	12.667	>0.05	0.062	>0.05
Are you take risks or do things that could be harmful?	13.493	>0.05	0	>0.05
To be "on the alert" or "on the lookout"?	9.723	>0.05	0.021	>0.05
A feeling of constant tension?	21.89	0.005	0.058	>0.05
Difficulty concentrating?	23.109	0.003	0.096	0.027
Have trouble falling asleep or waking up at night?	14.322	>0.05	0.097	0.025
During the past month, have you been bothered by recurring, disturbing, and unwanted memories of stressful experiences?	1.152	>0.05	0.044	>0.05

It has been proven that ‘Repeated, disturbing dreams about stressful experiences’, ‘Difficulty concentrating’, ‘Problems falling asleep or waking up at night’ increase significantly ($p < 0.05$) increase with age. The “feeling of constant tension” does not depend on age in a linear way. Other symptoms do not clearly depend on age.

Discussion

Scientists from different countries are actively conducting research on the onset, duration, diagnosis, and treatment of combat-related PTSD. The Ukrainian population has experienced a significant number of traumatic events caused by the ongoing hostilities in the eastern part of the country, the annexation of territories, and significant human losses that affected many families. These events had a negative impact on the life of all Ukrainian citizens, especially young people, causing constant anxiety and tension as predictors of emotional burnout and increased cases of stress disorders. Therefore, we analyzed scientific works on PTSD, where we identified the factors that cause these conditions during the military conflict with the Russian Federation, as well as reviewed guidelines for diagnosis, prevention, and treatment.^{9,10}

In times of war, children and youth face various forms of violence, traumatic events, and many factors that affect their physical, emotional, social, and cognitive development. These challenges can pose serious threats to the mental/mental health of children and youth. Children exposed to war, flight, and internal displacement show a wide range of possible reactions to distress and stress, such as specific fears, dependent behaviors, prolonged crying, sleep disturbances, lack of interest in the environment, and psychosomatic symptoms.^{11,12}

According to the United Nations Children's Fund (UNICEF), during the ATO/JFO period (2014-2022), 40.0% of Ukrainian children aged 7–12 witnessed war-related events, and 50% of children aged 13-18

witnessed war-related events (14% witnessed the operation of military equipment; 13% witnessed the aftermath of battles; 2.2% witnessed combat clashes; 4% and 15% witnessed violence and beatings of acquaintances; 6% and 5% witnessed threats of use of weapons).

Since the beginning of the war in Ukraine in 2014 (ATO/JFO), a retrospective analysis of the population of Kharkiv and Lviv revealed 23% of respondents with symptoms of PTSD among 65% of internally displaced persons (IDP). The prevalence rate was observed in different groups by sociodemographic characteristics.¹³

A significant proportion of Ukrainian students over 12 years of study have mental health disorders during the war: depressive symptoms (33.9–38.1%); anxiety symptoms (30.8–38.9%); PTSD (42.2–46.8%). The proportion of female students with mental disorders is 3–4 times higher than that of male students. The presence of chronic diseases, the educational field (52.8% of medical students have signs of depressive disorders compared to 31.5% in students of other educational fields ($p < 0.001$)), and the fact of direct participation or witnessing of military events contribute to the increase in the level of mental disorders among students of Ukrainian higher education institutions.¹³

The prevalence of PTSD and traumatic events among young people as a result of the Russian invasion of Ukraine found that 68.7% of young people reported various traumatic events in their lives during hostilities, 39.7% experienced bowing events, and 38.0% cases of domestic violence. As a result, 70% of the respondents met the criteria for PTSD (DSM-5) and 31.0% for PTSD (ICD-11).^{14,15}

Among 563 Ukrainian students who studied and lived in Kyiv during hostilities between December 2022 and January 2023, 91.5% of Ukrainian students reported one stressor related to the hostilities in Kyiv at the time, while 20.8% reported four or more stressors. Of the total number of respondents, 59.5% of Ukrainian students attributed stressors to military conflict, 54.5% to forced separation from family members, 53.3% to lack of housing, and 15.6% to the loss of a family member or friend. These students had 12.4% probable PTSD (ICD-11) and 11.2% general PTSD among respondents.¹⁶

According to an online survey of 98.0% of Ukrainian university students from western Ukraine, 86% had been in the war, 86% had seen combat directly, 49% reported symptoms of the insomnia, and 27% of students were diagnosed with PTSD. It was suggested that multidisciplinary integrated intervention programs should be used to treat PTSD in students and that they have a good effect.¹⁷⁻²⁰

The identified unfavorable features of the mental/mental health of Ukrainian students during the war may lead to negative consequences in the future, in particular, provoke the emergence of new noncommunicable diseases: cardiovascular diseases, immune disorders, diabetes mellitus. Therefore, it is necessary to continue to monitor the behavioral factors and the state of mental/mental health of Ukrainian students, as well as to raise awareness of early signs of PTSD. Another important issue today is the improvement of preventive measures in higher education institutions in relation to mental / mental health. Particular

attention should be paid to risk groups: female students, students who were direct participants or witnesses of military events.

Conclusion

The study of long-term psychological consequences of a full-scale war among students of Ukrainian higher education institutions students is a relevant scientific topic that requires in-depth analysis, monitoring, and rapid response and improvement of the mental state of Ukrainian students.

Among Ukrainian students in higher education institutions, mental/mental health disorders were diagnosed due to their direct participation in hostilities or stay in the war zone: 45.9% of respondents of technical higher education institutions and 24.8% of medical higher education medical institutions in Ukraine. Sexual violence (rape, attempted rape, coercion to perform any type of sexual act by force or threats) among students in higher education institutions was experienced by 18.9% of respondents of technical specialization and 16.9% of respondents of medical specialization. The identified unfavorable characteristics of mental / mental health during hostilities may further lead to long-term negative consequences in the future. Particular attention should be paid to risk groups, particularly female students. Further prospects for solving the problem from Ukrainian PTSD among students of medical and technical higher education institutions include psychodiagnostics using the methods “Identification of potentially traumatic events in life among students” and “Checklist of PTSD symptoms” for early intervention, psychocorrection, psychotherapy (group, individual), reflexology and preventive measures to improve stress resistance in students.

Declarations

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Author contributions

Conceptualization, V.C., H.S. and M.S; Methodology, M.A.; Software, V.C. and M.A.; Validation, M.A.; Formal Analysis, V.C., M.A., V. K. and N. P.; Investigation, V.C. and M.A. Resources, V.C.; Data Curation, V.C., M.A.; Writing – Original Draft Preparation, V.C., A.M. and N. P.; Writing –Review & Editing, H.S.; Visualization, H.S. and M.S.; Supervision, V.C.; Project Administration, V.C.; Funding Acquisition, V. K., V. C. and H.S.

Conflicts of interest

The authors declare no competing interests.

Data availability

The datasets used and/or analyzed during the current study are open from the corresponding author on reasonable request.

Ethics approval

All subjects gave informed consent to the inclusion prior to participating in the study. The study has been approved by the Bioethics Committee at the University No 2023/09/01.

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