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ABSTRACT

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MENTAL HEALTH OF MEDICAL STUDENTS DURING WARTIME

Introduction. Preserving the mental health of Ukrainians during wartime remains one of the most urgent challenges for the national healthcare system. Continuous monitoring of psychological well-being is essential for developing effective recovery strategies and fostering resilience, particularly among young people in medical education who are expected to provide care to others in the future.

Objective. This study aimed to assess the impact of the war in Ukraine on the mental health of medical students at Sumy State University.

Materials and Methods. The mental health status of the students was evaluated using the Goldberg General Health Questionnaire (GHQ-28), which measures four domains: somatic symptoms, anxiety and insomnia, social dysfunction, and depression. A total of 105 students (72 females and 33 males) aged 18–22 years participated in the anonymous survey conducted from May 2024 to January 2025. The study was conducted in accordance with the Declaration of Helsinki (World Medical Association, "Ethical Principles for Medical Research Involving Human Subjects," 2013 revision). Statistical analysis was carried out using descriptive statistics with the Microsoft Open Value Subscription program.

Results. The findings revealed that 85% of the respondents experienced a deterioration in mental health related to wartime stress. The most prevalent psychological disturbances were anxiety and insomnia (80%), followed by social dysfunction (65%) and somatic symptoms (60%). Depressive manifestations were observed in 11% of the participants. Female students demonstrated a higher vulnerability to stress and emotional distress than their male peers.

Conclusions. Wartime conditions significantly affect the psychological well-being of medical students, compromising their academic performance and professional preparedness. To sustain

effective learning and adaptation, it is crucial to provide targeted psychological support, implement mental health monitoring, and develop training programs focused on self-regulation and stress resilience in crisis environments.

Keywords: mental health, anxiety, depression, insomnia, General Health Questionnaire, medical students, war in Ukraine.

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МЕНТАЛЬНЕ ЗДОРОВ'Я СТУДЕНТІВ-МЕДИКІВ У ВІЙСЬКОВИЙ ЧАС

Вступ. Збереження ментального здоров'я українців під час війни залишається одним із найнагальніших викликів для національної системи охорони здоров'я. Постійний моніторинг психологічного благополуччя є важливим для розробки ефективних стратегій відновлення та розвитку стійкості, особливо серед молодих людей, які здобувають медичну освіту та повинні надавати допомогу іншим у майбутньому.

Метою даної роботи було з'ясування впливу війни в Україні на ментальне здоров'я студентів-медиків Сумського державного університету.

Методи. Стан ментального здоров'я студентів оцінювався за допомогою Опитувальника загального здоров'я Голдберга (GHQ-28), який вимірює чотири сфери: соматичні симптоми, тривога та безсоння, соціальна дисфункція та депресія. В анонімному опитуванні, яке проводилося з травня 2024 року по січень 2025 року, взяли участь 105 студентів (72 жінки та 33 чоловіки) віком 18–22 років. Дослідження проводилося відповідно до Гельсінської декларації ВМА «Етичні принципи медичних досліджень за участю людини у якості об'єкта дослідження», редакція 2013 року). Статистичний аналіз проводився за допомогою описової статистики з використанням програмного забезпечення Microsoft Open Value Subscription.

Результати. Результати дослідження показали, що негативний вплив війни спричинив погіршення стану ментального здоров'я у 85 % студентів. Найпоширенішими порушеннями психоемоційної рівноваги у студентів були тривожність та безсоння (80 %), далі йшли прояви соціальної дисфункції (65%) та соматичні симптоми (60%). Депресивні прояви спостерігалися у 11% учасників. Студенти-жінки продемонстрували вищу вразливість до стресу та емоційних переживань порівняно зі своїми однолітками-чоловіками.

Висновки. Умови воєнного часу суттєво впливають на психологічне благополуччя студентів-медиків, погіршуючи їхню академічну успішність та професійну підготовленість. Для забезпечення ефективної академічної діяльності та адаптації студентів під час війни вкрай важливо надавати цілеспрямовану психологічну підтримку, впроваджувати моніторинг психічного здоров'я та розробляти навчальні програми, спрямовані на формування навичок саморегуляції та стресостійкості в кризових умовах.

Ключові слова: ментальне здоров'я, тривожність, депресія, безсоння, загальний опитувальник стану здоров'я, студенти-медики, війна в Україні.

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INTRODUCTION

The war is a fatal threat to human life, health, and psycho-emotional well-being. The eastern regions of Ukraine suffer the most from military actions; therefore, the population of border cities lives in a state of constant danger and stress. Under the influence of war, both individual and collective traumatization occur, which negatively affects not only individual psychosomatic health but also public health [1]. The survival mode during wartime, combined with the post-COVID situation, increases the burden on public health due to mental disorders. The destructive impact of war on mental health results in post-traumatic stress disorder , anxiety, depression, insomnia, and other conditions [2, 3]. Prolonged stress negatively affects all organ systems, leading to complex biochemical and physiological disorders and, as a result, to the development of cardiovascular, neurological and other pathologies [4, 5]. According to forecasts by experts of the Ministry of Health, psycho-emotional disorders will remain widespread for another 7–10 years after the end of the war. Currently, the Ukrainian population is experiencing collective trauma, the consequences of which may be reflected in future generations [6, 7].

In modern conditions, one of the significant stress factors is the huge flow of information containing visual content about the consequences of war. The constant exposure to war news, sounds of explosions, and air raid alarms overloads the nervous system and leads to its exhaustion [8]. During the war, most Ukrainians began to experience memory deterioration, rapid fatigue, emotional imbalance, and, consequently, reduced work capacity and difficulties in social, educational, and professional activities [9].

A category of the population particularly vulnerable to stress is young people. During the COVID-19 pandemic, youth were at the most significant risk of mental health disturbances due to prolonged exposure to stress factors. Psycho-emotional disorders are most often observed among young people aged 20–30 years [5]. This period of life is associated with obtaining education and professional self-realization. Studying under wartime conditions requires significant effort, as prolonged stress leads to difficulties in concentrating attention, narrowing of the attention field, deterioration of memory performance and information recall, and reduced levels of creative thinking [7]. Psychological safety of the individual is a significant factor in successful self-realization [8]. Under wartime conditions in Ukraine, the preservation and stabilization of mental health acquire paramount importance. The current psychological state of Ukrainians requires constant monitoring and self-regulation, since mental health forms the foundation of physical health [9].

This study aimed to determine the impact of war-related stress factors on the mental health of medical students at Sumy State University.

MATERIALS AND METHODS

Study design and sample

The study employed a combination of clinical, psychometric, and statistical research methods. Clinical methods included a structured clinical interview conducted with each participant to collect sociodemographic information and assess subjective psycho-emotional complaints related to wartime stress. The descriptive cross-sectional study was conducted at the Academic and Research Medical Institute of Sumy State University between May 2024 and January 2025. The entire population of 105 students aged 18–21 years (72 females and 33 males) was included in the study sample. To assess the mental health status of the students, they were interviewed after obtaining informed consent.

Data collection

Participants were provided with detailed instructions on how to complete the questionnaire and were assured that their responses would remain anonymous and confidential. A checklist was used to collect demographic data, including age, gender, and year of study. Each participant was given up to five minutes to complete the questionnaire.

Questionnaire preparation and validation

The General Health Questionnaire-28 (GHQ-28) was used in this study (Table 1) [10]. The GHQ-28 comprises four domains with seven items each, designed to identify somatic symptoms (items 1–7), anxiety and insomnia (items 8–14), social dysfunction (items 15–21), and depression (items 22–28).

Students compared their recent psycho-emotional state with their usual state. The questionnaire offered four response options: A – «Not at all», B – «No more than usual», C – «Rather more than usual», D – «Much

more than usual» [11]. Responses "A" and "B" were scored as 0 points, while "C" and "D" as 1 point [12]. The total GHQ-28 score was calculated by summing the points of all 28 items, yielding a possible range of 0 to 28. Higher scores indicated poorer mental health status. A total score of greater than 8 (out of 28) or greater than 3 (out of 7) within any subscale was interpreted as suggestive of a possible mental health disorder [11].

Table 1 – **The 28 items of the General Health Questionnaire (GHQ-28) [Goldberg, 1979]**

№	HAVE YOU RECENTLY	A	B	C	D
Somatic Symptoms					
1	Felt perfectly well and in good health?				
2	Felt in need of extra energy or support?				
3	Felt run down or out of sorts?				
4	Felt that you were ill?				
5	Experienced headaches?				
6	Experienced a feeling of tightness or pressure in your head?				
7	Experienced hot or cold spells?				
Anxiety and Insomnia					
8	Lost much sleep due to worry?				
9	Had difficulty staying asleep once you had fallen asleep?				
10	Felt constantly under strain?				
11	Been irritable or bad-tempered?				
12	Felt scared or panicky without a good reason?				
13	Felt overwhelmed by everything?				
14	Felt nervous or “on edge” all the time?				
Social Dysfunction					
15	Managed to keep yourself busy and occupied?				
16	Taken longer than usual to complete tasks?				
18	Felt, on the whole, that you were doing things well?				
18	Been satisfied with the way you have carried out your tasks?				
19	Felt that you were playing a useful part in things?				
20	Felt capable of making decisions about things?				
21	Been able to enjoy your normal day-to-day activities?				
Depression					
22	Thought of yourself as a worthless person?				
23	Felt that life is entirely hopeless?				
24	Felt that life is not worth living?				
25	Thought about the possibility of harming yourself?				
26	Felt at times that you could not do anything because your nerves were too bad?				
27	Wished that you were dead and away from it all?				
28	Found that the idea of taking your own life kept coming into your mind?				

Data analysis

The analysis of the obtained data was performed using the Microsoft Excel program and Microsoft Open Value Subscription program (a licensing agreement for Sumy State University V1409354). Descriptive statistics were performed with the calculation of Mean ($\bar{X}$), Median (Me), Mode (Mo), Standart Deviation (SD), and Coefficient of Variation (CV). Inferential statistical methods included the independent samples t-test (for comparison of mean age) and the chi-square (χ^2) test (for comparison of categorical variables, including gender distribution and frequency of psycho-emotional disturbances). A p-value of <0.05 was considered statistically significant.

Ethical considerations

The present study was conducted in accordance with the principles of the WMA Declaration of Helsinki “Ethical principles for medical research involving human subjects” and the “Universal Declaration on Bioethics and Human Rights” (UNESCO). The research protocol

was approved by the Bioethics Committee for experimental and clinical research at the Academic and Research Medical Institute of Sumy State University (Minutes № 1/10 dated October 2, 2025).

RESULTS

This study investigated the impact of war-related stress factors on the mental health status of medical students aged 18–21 years, enrolled in the 2nd and 3rd years of the Academic and Research Medical Institute at Sumy State University. Mental health status was assessed using a student survey based on the General Health Questionnaire (GHQ-28; Goldberg test).

The Table 2 presents the demographic characteristics of the participants, including mean age, range, median, and coefficient of variation (CV%), as well as the distribution by gender. Inferential statistics (p-values) are provided to indicate the significance of differences between the subgroups of students.

Table 2 – **Demographic characteristics of the students**

Variables	Average age (M ± SD)	Range	Median	CV (%)	Total number (n)	Female n (%)	Male n (%)	p-value
All participants	19.76±0.77	18-21	19.8	3.9	105	72 (69	33 (31)	-
2nd-year students	19.00±0.47	18-20	19.0	2.5	45	26 (58)	19 (42)	-
3rd-year students	20.03±0.39	19-21	20.0	1.9	60	46 (77)	14 (23)	p<0.001*

Note: data are presented as mean (M) ± standard deviation (SD) and frequencies (%). CV – coefficient of variation. Statistical significance was determined by independent samples t-test (for age) and chi-square test (for gender)

It was found that the mean total score of the medical students' GHQ-28 was 12.65 ± 0.87. Compared to studies of this indicator during the COVID-19 pandemic (total score GHQ-28 was 9 ± 0.6) [13], it can be concluded that the negative impact of stress on students' mental health during the war is substantially greater than in previous years.

Numerous studies indicate that men and women respond differently to stress. In the present study, a comparison of GHQ total scores between male and female students was performed. According to the results, the total GHQ score in female students was slightly higher than in males (12.98 ± 0.51 vs. 12.02 ± 0.29, respectively).

Comparison of GHQ total scores between 2nd- and 3rd-year students revealed no significant differences (2nd year: 13.07 ± 0.39; 3rd year: 12.51 ± 0.44). Thus, based on the total GHQ scores, female students represented the most vulnerable group to stress.

According to our study, 85% of medical students experienced a deterioration in their mental health during wartime. The next step of our study was to examine the frequency of different mental health disturbances among medical students in the context of stress reactions. We compared the prevalence of somatic symptoms, anxiety and insomnia, social dysfunction, and depression between female and male students (Table 3). The analysis of

Table 3 – **Descriptive statistics of the frequency (%) of psycho-emotional disturbances among medical students**

Variables	Total score >8	Somatic symptoms	Anxiety, insomnia	Social dysfunction	Depression
All participants	85	60	80	65	11
Female	84	71	78	69	12
Male	89	34*	79	76	10
2nd-year students	93	56	83	80	10
3d-year students	80	63	79	64	13
Mean ($\bar{X}$)	86.2	56.8	79.8	70.8	11.2
Mode (Mo)	-	-	79	-	10
Median (Me)	85	60	79	69	11
Std. Dev. (SD)	4.49	13.5	1.92	7.04	1.30
Coefficient of Variation CV (%)	5.2%	23.8%	2.4%	9.9%	11.6%

*Note: * – $p \leq 0,05$ compared to female, "-" indicates no repeated value (a data set has no clear mode)*

psycho-emotional disturbances among medical students revealed varying levels of symptom prevalence across subgroups. Overall, 85% of participants had a total score greater than 8 on the assessment scale, indicating a generally high level of psycho-emotional stress in the cohort. Among all examined symptoms, anxiety and insomnia were the most frequently reported disturbances, with a mean prevalence of 79.8% across groups. This domain also demonstrated the lowest variability (SD = 1.92; CV = 2.4%), suggesting that high anxiety levels were consistently observed in all subgroups. In contrast, somatic symptoms exhibited the greatest variability (SD = 13.5; CV = 23.8%), indicating marked differences between male and female students and between academic years.

Social dysfunction was reported by an average of 70.8% of respondents (SD = 7.04; CV = 9.9%). Depressive symptoms were less frequent overall (mean = 11.2%; SD = 1.30; CV = 11.6%), though a slightly higher prevalence was observed among 3rd-year students (13%) and females (12%). Gender differences were evident: female students reported higher rates of somatic symptoms (71%) and depression (12%) than males, while male students showed slightly higher levels of social dysfunction (76%). Across academic years, 2nd-year students demonstrated the highest overall stress levels (total score >8 = 93%), whereas 3rd-year students had somewhat lower overall scores (80%) but the highest depression rates.

The mean total score for all groups was 86.2% (SD = 4.49; CV = 5.2%), indicating a generally high and homogeneous prevalence of psycho-emotional disturbances among the participants.

DISCUSSION

In wartime conditions, maintaining not only physical but also mental health has become an urgent task for the medical sector. Following the prolonged stress experienced during the COVID-19 pandemic, the mental health of Ukrainians has been further undermined by the war [1]. The population of border cities, where air raid alarms sound almost continuously, is especially affected. Children and young people are particularly vulnerable to the effects of stress [6]. Mental health disorders are most frequently observed among individuals aged 20–30 years [5]. Studies conducted among children, adolescents, and university students in Kharkiv revealed a prevalence of psycho-emotional disturbances such as anxiety, insomnia, and depression [14, 15].

This study examined the mental health of medical students studying in Sumy. According to the obtained data, over 85% of the students reported that stress during wartime negatively affects their mental health, with women being more vulnerable to stress than men [1-2]. According to O. Mazur et al., post-traumatic stress disorder occurs in one of five women and one of ten men during wartime [5]. T. Peresypkina T. et al. reported that disturbances in students' psycho-emotional balance negatively affected their academic performance [15].

For medical students, constant exposure to stress factors caused by the war is combined with significant psycho-emotional strain due to the demanding nature of medical education, which requires mastering large volumes of complex material. This leads to exhaustion of the nervous system. The most common manifestations of mental health disorders include chronic fatigue, emotional instability, anxiety, apathy, insomnia, and depression [7, 9].

According to our study, 80% of medical students experience anxiety and insomnia, 65% suffer from social dysfunction, 60% from somatic symptoms, and 11% from depression. Psycho-emotional disturbances are widespread among medical students, with anxiety and insomnia being the most common. These data are consistent with the findings of other researchers who indicated a high incidence of anxiety and sleep disorders among young people during wartime [16-17]. Somatic and depressive symptoms show notable variability between groups. The overall coefficient of variation indicates relatively stable but high prevalence rates across subgroups.

Female and 2nd-year students appear particularly vulnerable to psycho-emotional strain. This is likely related to men's higher level of stress resilience compared to women, as confirmed by the literature [1, 5].

The high prevalence of mental health disorders among medical students can be explained by the long-term and continuous exposure to stress in the border city. O. Riga et al. found that war-related stress caused sleep disorders among children aged 11–18 living in the border city of Kharkiv [14]. It is known that the level of stress and the overall incidence of psycho-emotional disorders depend on the living conditions Ukrainians face during the war. The lowest levels of stress were recorded among those living in regions distant from active hostilities [7]. According to M. Kutura, 43.65% of students at Ivano-Frankivsk National Medical University exhibited heightened situational anxiety due to the war [16]. Compared with our findings, the prevalence of anxiety among Ivano-Frankivsk medical students was twice as low as among those in Sumy, supporting the correlation between stress levels and proximity to danger during wartime.

According to V. Predko et al., 65.9% of Ukrainians consider the war as a traumatic experience, and 63.7% of respondents reported moderate to high stress levels [7]. The negative changes in Ukrainians' mental state

highlight the need to implement effective psychological support strategies during wartime to foster self-regulation and resilience. One general psychological recommendation for maintaining mental health is to limit exposure to news, messages, and videos about military events [8]. Information-related stress adds an extra burden to the nervous system [6]. It has been also noted that the most common coping strategies and resilience factors among Ukrainians included intellectual or physical work, volunteering, creative activity, and social interaction [6, 7].

Studying during wartime requires considerable intellectual and emotional effort. Chronic stress leads to declining students' academic performance [9], although maintaining learning motivation remains crucial. Continuous engagement in classes and preparation helps shift students' focus from the war to their future professional development. Psychological support from teachers plays an indispensable role, assisting students to develop self-control skills to overcome emotional challenges during medical training in wartime conditions.

CONCLUSIONS

The negative impact of wartime stress has caused psycho-emotional disturbances in 85% of medical students. The most frequent mental health disorders were anxiety and insomnia (80%), while depression (11%) was the least common. In the gender aspect, female students demonstrated lower stress resilience than male students. Female students showed higher prevalence rates of somatic symptoms (71% vs. 34%) and depressive symptoms (12% vs. 10%), while male students demonstrated slightly higher levels of social dysfunction (76% vs. 69%).

Maintaining students' mental health during wartime requires developing and implementing strategies aimed at psychological assistance, informational and communicative support, and creating recovery spaces to promote resilience and well-being.

PROSPECTS FOR FUTURE RESEARCH

Future research should focus on monitoring stress levels among university students to develop measures for preserving and restoring their mental and emotional well-being, ensuring effective academic performance under wartime conditions.

AUTHOR CONTRIBUTIONS

Inshyna N.M.: idea and study design; data collection and analysis; statistical analysis; writing the paper; final approval of the paper

Chorna I.V.: idea and study design; data collection and analysis; statistical analysis; critical review; final approval of the paper.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

ETHICAL CONSIDERATIONS

The present study was conducted in accordance with the principles of the WMA Declaration of Helsinki "Ethical principles for medical research involving human subjects" and the "Universal Declaration on Bioethics and Human Rights" (UNESCO). The research protocol was approved by the Bioethics Committee for experimental and clinical research at the Academic and Research Medical Institute of Sumy State University (Minutes № 1/10 dated October 2, 2025).

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