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Mental state of medical students three years into the war

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of the article

The aim of the study was to assess the mental health status of higher medical education students three years into the war in Ukraine.

Materials and methods. 104 students were interviewed at Dnipro State Medical University from February 24 to March 2, 2025, coinciding with the third anniversary of the martial law implementation in Ukraine. The Patient Health Questionnaire (PHQ-9) was used to identify depressive symptoms, while anxiety levels were assessed using the Generalized Anxiety Disorder Scale (GAD-7). Sleep quality components, such as feeling rested after waking, difficulty falling asleep, problems maintaining deep sleep as well as physical and mental components of health-related quality of life (QOL) were evaluated using the visual analog scale.

Results. The study has revealed that 61.5 % of medical students experienced anxiety of varying severity; 39.4 % had clinically significant anxiety, and 18.3 % reported severe anxiety. At the same time, 18.3 % of students exhibited pronounced functional impairment (≥8 points). Depressive symptoms of any severity were present in 76.9 % of respondents; 39.4 % had clinically significant depression, and 19.2 % had severe depression. Difficulty falling asleep was reported by 57.0 % of students, mostly of mild-to-moderate severity; 49 % experienced disturbed deep sleep, with 12.0 % reporting severe disturbances. The majority of students expressed dissatisfaction with sleep quality: 33.0 % reported moderate dissatisfaction, and 23.0 % indicated significant rest disturbance. Moreover, only 38.0 % of respondents reported no impairment in the mental component and 54.0 % – in the physical component of QOL.

Conclusions. Ensuring the psychological resilience of medical students in Ukraine is critically important. Psychological support should focus not only on managing anxiety, depression, and sleep disorders but also on improving health-related quality of life to enhance overall resilience.

Keywords: anxiety, depression, quality of life, students, sleep disorders, insomnia, armed conflicts, Ukrainian people.

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Психічний стан студентів-медиків через три роки війни

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Мета роботи – визначення психічного стану здобувачів вищої медичної освіти через три роки війни в Україні.

Матеріали і методи. У період із 24 лютого до 2 березня 2025 року, що збігається з третьою річницею з часу запровадження воєнного стану в Україні, опитано 104 студенти Дніпровського державного медичного університету. Для виявлення депресивної симптоматики використано Опитувальник здоров'я пацієнта (PHQ-9), рівень тривожності визначено за допомогою Шкали генералізованого тривожного розладу (GAD-7). З використанням візуальної аналогової шкали здійснили оцінювання таких компонентів якості сну, як відчуття відпочинку після пробудження, труднощі з засинанням, проблеми з підтримання глибокого сну, а також оцінювання фізичного та психічного компонентів якості життя.

Результати. У результаті дослідження психічного стану здобувачів вищої медичної освіти встановлено: 61,5 % опитаних мали тривогу різних ступенів вираженості, 39,4 % – клінічно значущу, 18,3 % – тяжку тривогу; 18,3 % студентів мали виражені порушення працездатності (8 і більше балів). Депресію різних рівнів діагностовано у 76,9 % опитаних, клінічно значущу – у 39,4 %, тяжку депресію – у 19,2 % студентів. Труднощі з засинанням мали 57,0 % опитаних, здебільшого легкого або помірного характеру; порушення глибини сну визначили у 49,0 % студентів-медиків, 12,0 % опитаних мали виражені порушення. Більшість респондентів повідомили про незадоволеність якістю відпочинку після сну: 33,0 % мали помірний рівень незадоволеності, 23,0 % – істотні порушення відпочинку. Лише у 38,0 % опитаних не визначено порушення психічного компонента, у 54,0 % – фізичного компонента якості життя.

Висновки. Забезпечення психологічної стійкості здобувачів медичної освіти є вкрай важливим в Україні. Психологічна підтримка має передбачати не лише полегшення та компенсацію симптомів тривоги, депресії, порушень сну, але й впливати на якість життя, пов'язану зі здоров'ям, для посилення резильєнтності.

Ключові слова: тривога, депресія, якість життя, студенти, порушення сну, інсомнія, збройні конфлікти, український народ.

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The population of Ukraine, including students of higher medical education, are under the influence of severe mental stress during martial law. It is known that prolonged exposure to stressors can lead to exhaustion through the mechanisms of distress, worsening health. The health status of medical students directly determines their learning effectiveness and consequently their ability to provide quality medical care in the future. A negative impact of martial law on students' mental health has been shown: 52.8 % of medical students had signs of depressive disorders compared to 31.5 % of students on other educational programs ($p < 0.001$) [1]. Typical manifestations of prolonged stress include anxiety, depression and sleep disorders, which ultimately negatively affect health-related quality of life (QOL). A higher level of exposure to armed conflict is associated with a higher

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prevalence of common mental health disorders among displaced persons [2].

For example, a large meta-analysis covering studies from 1945 to 2022 has found the cumulative prevalence of depression during wartime of 38.7 % (95 % CI: 30.0–48.3) and anxiety of 43.4 % (95 % CI: 27.5–60.7) [3]. Another meta-analysis of the mental disorder prevalence in forced migrants has revealed the current major depressive disorder prevalence of 25 % (95 % CI: 17–34); generalized anxiety of 14 % (95 % CI: 5–35), and younger age was associated with a higher incidence of these disorders [4].

In a study of the population in Syria with persisted hostilities for over nine years, the prevalence of clinically significant anxiety was 37.2 % and clinically significant depression was 65.4 % [5]. The percentage of students with depression and anxiety is alarming. The high prevalence rate can be primarily explained not only by threats to tangible reality, but also by the shift to remote learning [6]. The prevalence of depression and anxiety symptoms among widows of armed conflict in Afghanistan was 57.9 % (95 % CI: 52.7–62.8 %) and 61.5 % (95 % CI: 56.4–66.4 %), respectively, with significant differences in the incidence of symptoms depending on sociodemographic and health-related factors [7].

A representative survey of the Ukrainian population in September 2023 showed the prevalence of generalized anxiety disorder (using the International Anxiety Questionnaire [8]) at 15.2 % [9]. However, the simplest and most convenient tool for self-assessment of anxiety which performs well when using online surveys, is the Generalized Anxiety Disorder Scale (GAD-7) questionnaire which also allows anxiety to be distributed by severity [10]. For depression, a commonly utilized questionnaire in online screening surveys is the PHQ-9 [11].

So, anxiety was 8.0 (4.5; 12.5) points among the general Ukrainian population in the first weeks of war [12], averaging to 12.7 ± 5.4 points within the population of internally displaced individuals [13]. The severity of anxiety was slightly lower in higher education students: during the first year of the full-scale war, the median level of anxiety in Ukrainian medical students varied from 8 (5; 14) points 1 month after the beginning to 5.5 (3.5; 7.5) points a year later [14]. After two years, the prevalence of anxiety among medical students was 6 (3; 9) points [15]. In an online survey conducted across 17 universities in October 2023, 57.1 % of students had clinically significant depression (PHQ-9) and 34.0 % had clinically significant anxiety (GAD-7) with a mean anxiety score of 7.81 ± 5.60 points and a mean depression score of 11.6 ± 6.6 points [16]. To heighten the effect of anxiety on the population it is not necessary to be a party to a conflict. For example, the prevalence of anxiety (GAD-7 >10) during the Gaza conflict in 2023, in the Kuwaiti sample reached 52 % [17].

If the mental health of students during martial law is not controlled, it can lead to a decrease in their performance and deterioration in academic performance. On the other hand, there are recognized links between sleep disorders and suicide among students [18]. A study on the emotional and physical well-being of Ukrainian healthcare professionals has shown that the majority had high levels of anxiety and depression, and stress tolerance was inversely related to anxiety, depression, and the severity of somatic symptoms [19].

Therefore, studying the mental health of medical professionals and medical students, including sleep processes and their impact on the mental component of QOL, will help to identify signs of burnout and psychological exhaustion timely. Implementing preventive programs based on such findings may help mitigate future adverse health consequences.

Aim

The aim of the study was to assess the mental health status of higher medical education students three years into the war in Ukraine

Material and methods

The study was conducted in the format of a one-step cross-sectional epidemiological analysis. Data collection was carried out using a questionnaire through the online platform Google Forms (Alphabet Inc.) with the “snowball” method to distribute the questionnaire to participants. The sample included 104 students studying at Dnipro State Medical University. The median age of the respondents was 20 (19; 22) years. The majority of respondents were female – 73.1 % (76/104).

The study received approval from the Ethics Committee of Dnipro State Medical University (Protocol No. 23 dated March 19, 2025). All the participants provided written informed consent to participate in the study.

The survey was conducted from February 24 to March 2, 2025, coinciding with the third anniversary of the martial law implementation in Ukraine.

To identify depressive symptoms, the Patient Health Questionnaire (PHQ-9) was used with a depressive state determined by a score of 5 or more points on the corresponding scale [11]. The level of anxiety was evaluated using the GAD-7, where pathological anxiety was also defined by a score of 5 or more points [10]. Clinically significant depression and anxiety were defined when the respondents scored 10 or more points on the relevant scale. These questionnaires are effective in screening for mental health, and their global adoption facilitates comparing results with data from other studies. The questionnaire also included questions about various facets of sleep quality, such as feeling rested upon waking up, difficulty falling asleep, and problems maintaining deep sleep. Additionally, self-reported evaluations of the physical and mental aspects of QOL were assessed.

Data processing and statistical analysis were performed using the software package Statistica 6.1 (StatSoft Inc., serial number AGAR909E415822FA). The Shapiro–Wilk test was applied to assess the normality of distribution. Since the distribution was found to be non-normal, descriptive statistics were presented in the form of median (Me) and interquartile range (Q1; Q3). The significance of differences between the groups was assessed using the Mann–Whitney and χ^2 tests. Correlation analysis carried out using Spearman’s rank correlation coefficient, followed by mediation analysis. P-values less than 0.05 were considered statistically significant.

Table 1. Distribution of anxiety levels based on the GAD-7 scale by gender

Anxiety	Female		Male		Total	
	n, abs.	%	n, abs.	%	n, abs.	%
Absent	26	34.21 %	14	50.00 %	40	38.46 %
Mild	20	26.32 %	3	10.71 %	23	22.12 %
Moderate	16	21.05 %	6	21.43 %	22	21.15 %
Severe	14	18.42 %	5	17.86 %	19	18.27 %

Table 2. Distribution of depression based on the PHQ-9 scale by gender

Severity of depression	Female		Male		Total	
	n, abs.	%	n, abs.	%	n, abs.	%
Absent	15	19.74 %	9	32.14 %	24	23.08 %
Mild	30	39.47 %	9	32.14 %	39	37.50 %
Moderate	17	22.37 %	4	14.29 %	21	20.19 %
Severe	14	18.42 %	6	21.43 %	20	19.23 %

Table 3. Distribution of sleep disturbances

Category	No alterations	Mild	Moderate	Severe
Problems falling asleep	43 % (45/104)	36 % (37/104)	10 % (10/104)	11 % (13/104)
Disturbances in sleep depth	51 % (53/104)	23 % (25/104)	14 % (15/104)	12 % (12/104)
Waking up refreshed	16 % (18/104)	28 % (29/104)	33 % (34/104)	23 % (24/104)

Results

The median anxiety score was 7 (3; 12) points. The largest proportion of respondents (38.46 %) reported no significant anxiety symptoms, while 22.12 % had mild anxiety, 21.15 % – moderate, and 18.27 % – severe anxiety. The Cronbach's alpha coefficient for the GAD-7 scale in this study was 0.92, indicating high internal consistency.

The occurrence of anxiety by gender is shown in *Table 1*. The findings indicate that females more often demonstrated increased levels of anxiety compared to males, especially in the categories of mild and severe anxiety, but no significant differences have been found in anxiety scores by gender ($p = 0.24$).

Regarding the inquiry about reduced work capacity, the median score was 4 (range: 3–7) points, with 18.3 % (19/104) of respondents rating their work incapacity at 8 points or higher.

The median depression score was 8 (5; 13) points. Cronbach's alpha for the PHQ-9 in our study was 0.848. Depressive symptoms were absent in 23 % (24 individuals), with a notably higher prevalence among males – 32.14 % (9 individuals) as compared to females – 19.74 % (15 individuals), $p = 0.17$. Mild depression was the most common among all respondents, affecting 37.50 % (39 individuals). Moderate depression was detected in 20.19 % (21 individuals), while severe depression was observed in 19.23 % (20 individuals). Detailed gender-based depression prevalence is shown in *Table 2*. No significant gender differences were found in anxiety scores – $p = 0.34$.

Results of sleep disturbance evaluation are presented in *Table 3*.

Data on the mental component of QOL are shown in *Fig. 1*. Only 38 % of respondents were found to have intact mental health-related QOL, that was a noteworthy finding.

The correlations found in the study are illustrated in *Fig. 2*. A significant impact of anxiety, depression and physical health (PHQoL) on the mental health QOL (MHQoL) has been determined. Stronger associations have also been found between PHQ-9 scores and components of sleep disorders compared to those with anxiety severity. Among sleep parameters, only the feeling of being rested after sleep has shown a notable influence on the mental QOL. In contrast, disturbances in sleep depth were not significantly linked to anxiety severity, although they exhibited a considerable effect on perceived sleep depth.

The identified correlations suggest a close connection between sleep disturbances, anxiety, and depressive disorders, highlighting the significant influence of mental well-being on sleep regulation. The findings emphasize the need for an integrated strategy in managing individuals experiencing anxiety, depression, and sleep-related issues.

Considering the strong and moderate correlations between sleep disorders and anxiety and depression, scatter graphs have been constructed for further analysis *(Fig. 3, 4)*.

Given the pronounced similarity observed in the scatter graphs of anxiety, depression and the MHQoL, a mediation analysis was performed. This analysis has revealed that disturbed feeling of rest after sleep was a significant mediator between GAD-7 and the MHQoL ($z = 2.07$, $p < 0.05$). The effect was partial, since the direct effect of GAD-7 on the MHQoL remained significant ($b = 0.246$, $p < 0.01$) even after accounting for the mediating variable, though it was reduced from $b = 0.293$ to $b = 0.246$. This suggests that impaired sense of rest accounts for a part of the relationship between anxiety and MHQoL, but not its entirety. The reduction in GAD-7's direct effect from 0.293 to 0.246 implies that approximately 16 % of its impact on mental QOL is attributable to impaired or non-restorative sleep, while the remaining 84 % reflects a direct influence of anxiety regardless of sleep quality.

1

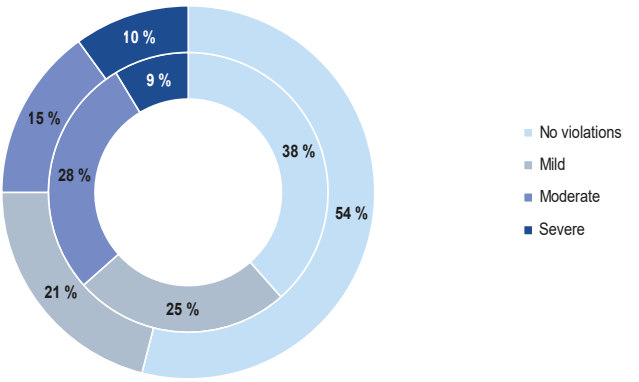


Fig. 1. Distribution of impairments in physical (outer circle) and mental (internal circle) components of quality of life, %.

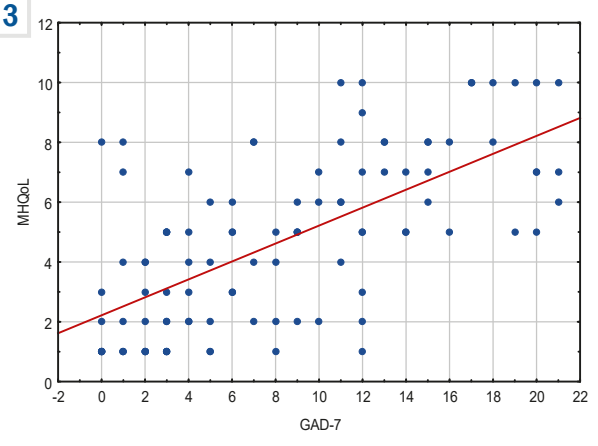
Fig. 2. Correlations between psychometric indicators.
*: all correlations with $p < 0.05$.

Fig. 3. Relationships between GAD-7 and the mental component of QOL.

Fig. 4. Relationships between GAD-7 and PHQ-9.

2

3



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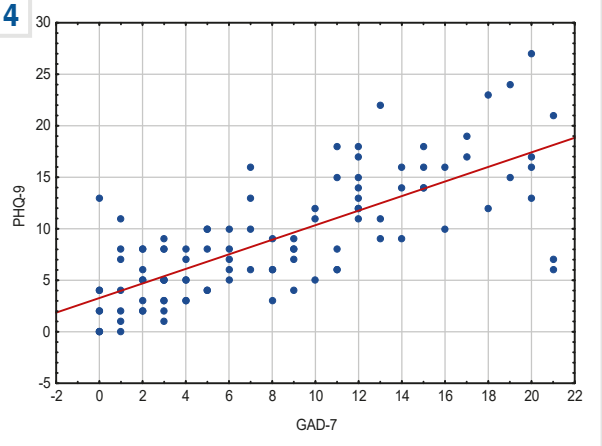

Discussion

The impact of prolonged stressors on the mental health of the population has concerned the attention of many researchers. This study contributes significantly to the understanding of mental health problems faced by medical students in a war-affected region, especially focusing on the association between sleep disorders, QOL and anxiety during the full-scale war in Ukraine. This study uniquely examines mental health outcomes three years following the onset of the conflict, enabling comparisons with prior research.

The findings elucidate critical factors influencing subjective perceptions of sleep quality and health-related quality of life (QOL) in relation to anxiety and depression, while also juxtaposing these results with earlier studies and discussing their practical implications.

Previous research conducted in peacetime settings reported a prevalence of clinically significant anxiety and depression among students at 19.7 % and 24.7 %, respectively [20], with comparable economic conditions as classified by the World Bank [21].

The dynamics of anxiety and depression in the population of Ukraine during the war makes us think about the search for mediating influences and protective mechanisms. In the initial phase of the war, the prevalence of clinically significant anxiety in the general Ukrainian population ranged from 37.86 % to 54.10 %, with depression ranging from 42.50 % to 46.80 % [12,22]. A similar trend was observed among students in higher medical education, with 37.8 % reporting clinically significant anxiety and 42.9 % reporting depression at the war's onset, aligning closely with findings from Czech students not directly exposed to conflict, where anxiety and depression prevalence were 36.0 % and 40.1 %, respectively [14,23].

One year following the onset of a large-scale conflict, the prevalence of anxiety and depression among medical students was reported at 5 % and 30 %, respectively [14]. After 18 months, these rates decreased to 15.2 % and 8.1 %, respectively [9], aligning with findings from Israeli researchers who observed a temporal decline in clinically significant anxiety and depression [24].

However, 20 months into the conflict, an online survey of students from 17 Ukrainian universities indicated that 34.1 %, 33.6 %, and 19.3 % experienced moderate to severe symptoms of anxiety, depression, and insomnia, respectively [16]. Two years into the war, pronounced anxiety persisted in 34.1 % of medical students, including 17.1 % of men and 38.9 % of women [25]. Medical students from the near-frontline regions reported moderate to severe symptoms of anxiety, depression, and sleep disturbances in 26.1 %, 32.8 %, and 22.0 %, respectively, after 24 months [15,26]. However, these data are significantly lower than those obtained in this study, conducted three years into the war (39.4 % for both anxiety and depression and 26.0 % for sleep disturbances) which may be explained by the increasing exposure to chronic stress and the escalation into the exhaustion phase. These figures are comparable to those observed in the initial months of the conflict, irrespective of geographic location [1,12].

Comparative data from Syrian students, exposed to a more protracted conflict, indicated a significantly higher prevalence of anxiety and depression than observed in this study [5], suggesting a potential correlation between conflict duration and mental health deterioration.

Conclusions

1. The data indicates a high prevalence of anxiety and depression among medical students three years into the conflict with only 38.46 % reporting no significant anxiety symptoms and 23.08 % free from notable depressive symptoms. Over 39 % of students experienced moderate to severe depression, adversely impacting their mental quality of life.

2. Sleep quality and feelings of restfulness post-sleep significantly impact mental health and overall quality of life. Only 16 % of respondents reported feeling fully rested after sleep, and this factor had a notable influence on the mental aspects of their quality of life. Mediation analysis has revealed a partial explanation of the association between anxiety (assessed via the GAD-7) and mental health caused by difficulty in feeling rested after sleep. Restorative sleep is thus critical for enhancing psycho-emotional well-being.

3. The strong correlations observed between anxiety, depression, sleep disorders, and mental quality of life highlight the interdependence of these conditions. This underscores the necessity for a comprehensive approach to enhancing the quality of life for students in educational settings.

Prospects for further research. Examining the effects of martial law on medical students' mental health is essential for creating and implementing preventive programs that enhance mental well-being, resilience and quality of life.

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