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ANXIETY, STRESS AND COPING STRATEGIES IN UKRAINIAN MEDICAL STUDENTS AFTER THE YEAR OF THE RUSSIAN-UKRAINIAN WAR

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In order to study the influence of coping mechanisms on the level of anxiety and stress in students of higher medical education under martial law, 314 students of the Dnipro State Medical University were interviewed. The median level of anxiety was found to be 7 (4;11) points, with a noticeable difference between men and women. The median level of stress severity was 5 (4;7) points, with a significant difference between men and women. Adaptive cognitive strategies were the most prevalent (45.5 %) in the sample, while adaptive, relatively adaptive, and non-adaptive strategies were found in comparable frequency (27.1 % and 27.4 %, respectively). It has been determined that implementing adaptive emotional strategies decreases the likelihood of experiencing significant levels of anxiety while employing maladaptive emotional strategies increases the risk by 2.79 times. The utilization of other coping mechanisms does not appear to have a significant impact on the chances of developing severe anxiety.

Keywords: psychoemotional state, coping strategies, anxiety, stress, GAD-7 scale, coping behaviour.

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ТРИВОГА, СТРЕС ТА СТРАТЕГІЇ ПОДОЛАННЯ У УКРАЇНСЬКИХ СТУДЕНТІВ-МЕДИКІВ ЧЕРЕЗ РІК ЗБРОЙНОЇ АГРЕСІЇ ПРОТИ УКРАЇНИ

Задля дослідження впливу копінг-механізмів на рівень тривоги та стресу у здобувачів вищої медичної освіти в умовах воєнного стану було опитано 314 студентів Дніпровського державного медичного університету. Медіанний рівень тривоги у досліджених здобувачів медичної освіти склав 7 (4; 11) балів з достовірною відмінністю між чоловіками та жінками. Медіанний рівень вираженості стресу склав 5 (4;7) балів, з достовірною відмінністю між чоловіками та жінками. Серед когнітивних стратегій у вибірці переважали адаптивні (45,5 %), відносно адаптивні та неадаптивні стратегії зустрічалися у співставній частоті: 27,1 % та 27,4 % відповідно. Було встановлено, що адаптивні емоційні стратегії зменшують шанси мати виражену тривогу, а неадаптивні емоційні стратегії – збільшують ризик в 2,79 рази. Використання інших стратегій достовірно не впливає на шанси виникнення вираженої тривоги.

Ключові слова: психоемоційний стан, копінг-стратегії, тривога, стрес, шкала GAD-7, долаюча поведінка.

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It is generally acknowledged that stressful events can cause a number of neurotic disorders, so the presence of a stressful event is a prerequisite for establishing diagnoses from the ICD-10 code range for Neurotic, stress-related and somatoform disorders. To reduce the harmful impact of stress on the human psyche, there are two unrelated mechanisms: unconscious, also known as "psychological defence mechanisms," whose role is related to reducing anxiety, but at the expense of distorting reality and the emergence of neurotic disorders, and conscious coping mechanisms that do not distort reality and do not cause other neurotic disorders. However, the question of whether coping mechanisms are effective in reducing the level of anxiety and preventing the development of generalized anxiety disorder remains unresolved. Studying at a higher medical education institution is not easy and often causes stressful reactions in students. The outbreak of a full-scale war on February 24, 2022, caused a significant increase in the number of stressful events in the lives of every citizen, including students of higher medical education. Studies have shown that the population of Ukraine has an increased level of anxiety, depression and stress due to the war. In the study of Xu et al. conducted in March 2022 among the adult population of Ukraine, it was found that 54.1 % of respondents reported symptoms of anxiety, and 52.7 % had symptoms of psychological distress; in the study of coping strategies, it was found that active coping is positively associated with anxiety symptoms, and coping with self-distraction is negatively associated with anxiety. The use of instrumental support and behavioral coping was negatively associated with psychological distress [15]. Military operations have negative effects on the mental health of not only the population of

the country where they take place but also other detached persons. For example, in a study of coping strategies in residents of Ukraine, Poland, and Taiwan, it was found that problem-focused and avoidance strategies were the most and least common in all countries, respectively. Meanwhile, the adoption of emotion-focused coping strategies was more strongly associated with depression and anxiety in Taiwanese and Polish respondents but not in Ukrainian respondents [6]. In the Romanian population, among the coping mechanisms studied, the strongest predictors of anxiety were focusing attention on emotions and their expression and behavioral elimination [7].

A study of the mental state of medical students in Finland found that the overall stress level increases over time, and transference was the main coping strategy [5]. Similar results were obtained in a study of medical students in Austria, where among the coping strategies, positive thinking and active coping were found to be associated with lower stress levels [14]. During the COVID-19 pandemic, when medical students also faced additional stressors, it was determined that positive coping styles were negatively associated with depression, and negative coping styles were vice versa [8].

The relevance of our work lies in the very fact that in our study we tried to identify not only the prevalence of generalized anxiety disorder among students and the level of stress during the war but also to find those coping strategies that significantly reduce the level of stress and reduce the probability of generalized anxiety disorder during the war, to formulate simple recommendations for medical students on how to cope with stressful events and prevent the onset of generalized anxiety disorder.

The purpose of the study was to investigate the influence of individual components of coping mechanisms on the level of anxiety and stress in higher medical education students under martial law.

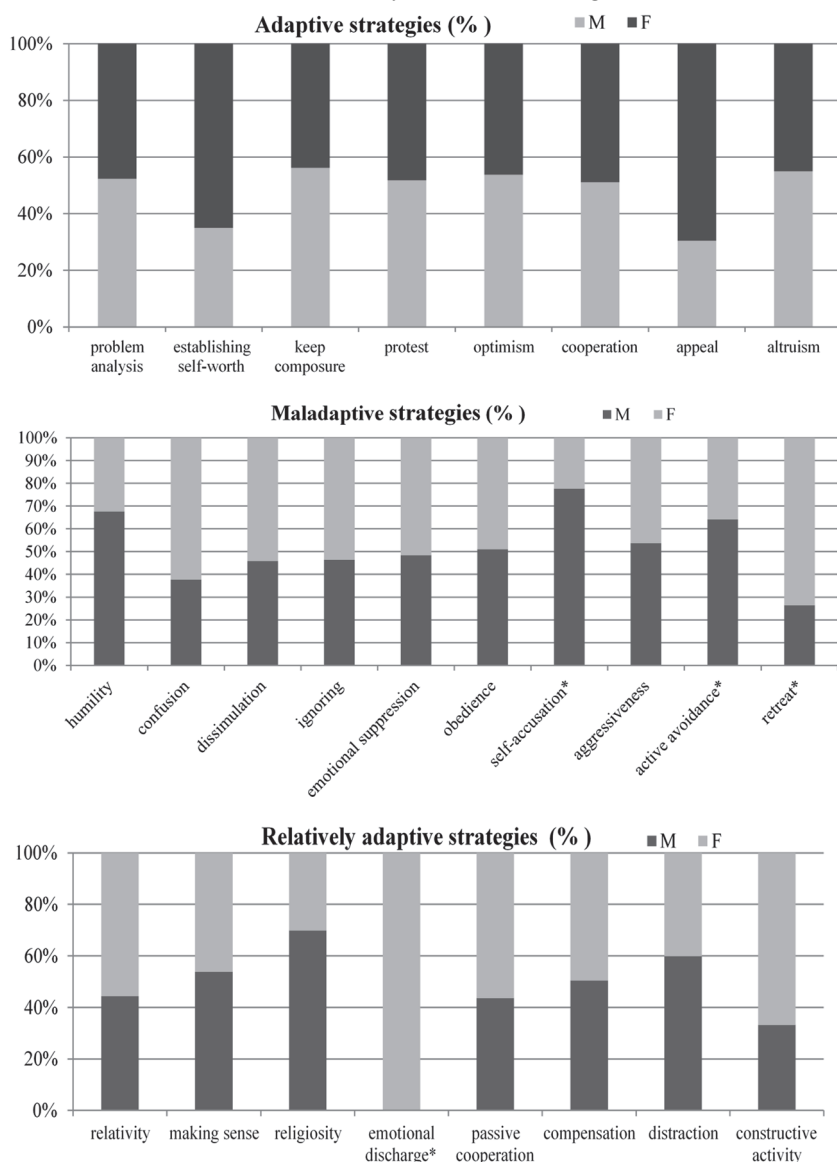


Fig. 1. Gender-related features of coping strategies in medical students: adaptive (a), maladaptive (b) and relatively adaptive (c) strategies.

Note: * – difference with the corresponding indicator by gender, $p < 0.05$

Materials and methods. Using an online questionnaire built on the Google Forms platform, 314 medical students (70 male and 244 female) of the 1st–6th years of Dnipro State Medical University aged 17 to 24 years were interviewed, as they filled in the questionnaire by themselves. There were no exclusion criteria. The study was conducted from February 11 to 16, 2023.

Anxiety symptoms were assessed using the Ukrainian version of the Generalized Anxiety Disorder Scale (GAD-7). A positive screening result for anxiety is a cutoff value of 10 or more points based on the GAD-7. Coping strategies were determined using E. Heim's methodology for determining individual coping strategies. The impact of stress on the subjects was assessed using an analogue scale, where 1 is the minimum and 10 is the maximum effect of stress on personality.

The Kolmogorov-Smirnov test with the Lilliefors correction was used to assess the normality of distribution of quantitative traits. Since the data obtained did not follow the normal distribution law, a nonparametric method was used to compare quantitative traits: Mann-Whitney U test. The statistical significance of the differences in qualitative and ordinal features was determined by Pearson's chi-square (χ^2) test, in particular with Yates' correction for continuity.

To analyze the relationships between binary traits, an analysis was performed to calculate the coefficient of association (ϕ). To quantify the impact of the studied factors on the result, as well as to develop a forecasting model, logistic regression analysis was used. The predictive ability of the model was evaluated using ROC analysis with the determination of AUC (CI 95 %).

Statistical analysis procedures were performed using the statistical package STATISTICA 6.1 (StatSoft Inc., Serial No. AGAR909E415822FA). ROC analysis with the calculation of the area under the ROC curve was performed using MedCalc® Statistical Software version 22.013 (MedCalc Software Ltd, Ostend, Belgium; <https://www.medcalc.org>; 2023) (TRAIL-vesion).

Results of the study and their discussion. The analysis of the data obtained as a result of the study showed that in general, adaptive cognitive coping strategies prevailed in the sample (45.5 %), while relatively adaptive and maladaptive strategies were found in comparable frequency: 27.1 % and 27.4 %, respectively, with no differences in gender. Among the emotional coping mechanisms, respondents most often (50.0 %) chose adaptive coping methods, while 12.7 % chose relatively adaptive mechanisms and 37.3 % chose maladaptive ones. Relatively adaptive behavioural coping strategies are characteristic of 41.1 % of respondents, 36.3 % of respondents had maladaptive coping strategies, and only 22.6 % of respondents had adaptive strategies.

Analyzing the difference in the prevalence of individual subgroups of coping strategies, we note that the difference depending on gender was recorded only for relatively adaptive emotional strategies. Gender-related features of different coping behaviours are shown in Fig. 1. It is noteworthy that there are no differences between types of adaptive strategies. Among maladaptive strategies, self-accusation and active avoidance are more common in men, and retreat is more common in women. For the relatively adaptive strategies, a reliable difference was observed only for emotional discharge, which was observed only among female students.

Evaluating the level of anxiety according to the GAD-7 questionnaire, we note that the median level of anxiety was 7 (4; 11) points with a reliable difference ($p < 0.001$) between 5 (2; 8) points for men and 8 (5; 12) points for women. Expressed anxiety (GAD > 10 points) was observed in 34.1 % of respondents, including 17.1 % of men and 38.9 % of women ($p < 0.001$).

When assessing the severity of stress, the median level was 5 (4; 7) points, with a reliable difference ($p < 0.001$) between 4 (2; 6) points for men and 5 (4; 7) points for women. Severe stress was observed in 75.5 % of the subjects: 55.7 % of men and 81.1 % of women ($p < 0.001$).

The analysis of associations between the presence of certain coping strategies and the occurrence of anxiety and stress is presented in Table 1.

Table 1

Associations between coping strategies for anxiety and stress (ϕ)

Predictor (coping strategy)		GAD>10	VAS, stress
cognitive	adaptive	-0.03	-0.02
	relatively adaptive	0.06	0.002
	maladaptive	-0.03	0.02
emotional	adaptive	-0.29*	-0.16*
	relatively adaptive	-0.09	-0.08
	maladaptive	0.24*	-0.10
behavioral	adaptive	0.07	0.01
	relatively adaptive	-0.03	0.04
	maladaptive	-0.03	-0.05

Note: * – $p < 0.05$

It should be noted that there was no association between the presence of severe anxiety and cognitive and behavioral strategies. With regard to emotional strategies, it was found that the presence of adaptive strategies reduces the probability of anxiety, and maladaptive strategies increase it. Regarding stress, only a weak relationship was found between adaptive strategies and the presence of severe stress.

All detected associations between the presence of anxiety and coping strategies in medical students who achieved and did not achieve severe anxiety according to the GAD-7 scale, including unreliable ones,

were included in the univariate logistic analysis. Due to the low level of association between stress levels and coping strategies, these data were not included in the logistic analysis. The data on the predictive power of the variables obtained in the univariate logistic analysis, along with the assessment of the quality of the equations and their predictive ability, are presented in Table 2.

Table 2

Predictors for the onset of anxiety (GAD>10)

Predictor (coping strategies)		OR (95 % CI)	p	AUC (95 % CI)
cognitive	adaptive	1.14 (0.71–1.81)	0.59	0.52 (0.46–0.57)
	relatively adaptive	0.75 (0.44–1.28)	0.29	0.53 (0.47–0.58)
	maladaptive	1.13 (0.67–1.89)	0.65	0.51 (0.46–0.57)
emotional	adaptive	0.28 (0.17–0.46)	<0.001	0.65 (0.60–0.71)
	relatively adaptive	1.70 (0.87–3.33)	0.12	0.53 (0.47–0.59)
	maladaptive	2.79 (1.72–4.53)	<0.001	0.62 (0.57–0.68)
behavioral	adaptive	0.70 (0.39–1.26)	0.23	0.53 (0.47–0.59)
	relatively adaptive	1.13 (0.70–1.81)	0.62	0.51 (0.46–0.57)
	maladaptive	1.14 (0.70–1.85)	0.59	0.52 (0.46–0.57)

The analysis shows that the presence of adaptive emotional strategies and maladaptive emotional strategies have a reliable effect on anxiety. The identified predictors have an average model quality based on AUC. Thus, adaptive emotional strategies reduce the probability of having severe anxiety, while maladaptive emotional strategies increase this risk by 2.79 times.

This is one of the very few studies to examine coping strategies and their relationship to mental health among medical students affected by war.

Comparing the data we obtained on the prevalence of types of coping, it differs significantly from the data obtained by N.S. Kostruba on a comparable age sample during the lockdown due to the COVID-19 pandemic [1]. The absence of a distinction between relatively adaptive cognitive and behavioral, maladaptive emotional, and adaptive behavioral strategies shows that coping behavior may depend on the severity of stress. Although the COVID-19 pandemic has been a significant challenge to mental stability, martial law with the risk of missile strikes even deep in the rear are more pronounced factors in the emergence of anxiety and the use of non-additive strategies as a response.

At present, there is no extensive data on the prevalence of anxiety and coping mechanisms during martial law among medical students. However, the prevalence of moderate and severe anxiety symptoms in adolescents attending school in a post-conflict area of Colombia during COVID-19 was 18.9 % (CI 95 % 16.0–22.1) [9], which is reliably less than in our study ($p < 0.001$). Such difference can be explained by the greater resilience of the adolescent psyche to stress factors and the absence of a real threat to life at the time of the study in Colombia. Also, a significant prevalence of anxiety in medical students was found during the COVID-19 pandemic [4, 11], but it is impossible to compare the coping strategies associated with anxiety in these studies with our study due to the use of different techniques for determining coping strategies.

Comparing the data we obtained with the data of W. Xu et al. we note that the prevalence of severe distress after a year of martial law is higher than after one month: 75.5 % vs. 52.7 % ($p < 0.001$), but it should be noted that a true comparison of the samples is impossible, since W. Xu et al. studied the entire population, not just students [15]. Additionally, it was found that productive coping strategies were significantly associated with mental health symptoms, which was limitedly comparable to the results of our study.

Our data showing that maladaptive emotional coping strategies in medical students increase the risk of anxiety, clarifies the findings of Amone–P’Oлак and Omech, who found that the use of maladaptive emotional strategies by young people affected by the war in Northern Uganda was significantly associated with a large number of mental health issues [3].

The data we obtained confirm the findings of a systematic review by Peevey et al. on mental disorders and coping strategies among internally displaced Colombians, which found no association between mental health and cognitive and behavioral strategies [12].

In the study of coping strategies and the relationship with mental health in conflict-affected individuals in the Republic of Georgia, it was found that certain cognitive and behavioral strategies showed one of the strongest associations with poor mental health in men and women [13]. These results are significantly different from those obtained in our study, which can be explained by the difference in study

design, as we studied young people during the conflict, while Saxon et al. studied the entire population 3 or more years after the end of hostilities.

Conclusions

1. The majority of the sample participants (45.5 %) used adaptive cognitive strategies to cope with difficult situations, and the use of adaptive and maladaptive strategies had approximately the same frequency ratio: 27.1 % and 27.4 %, respectively. Among the emotional coping mechanisms, respondents most often (50.0 %) chose adaptive ways, while 12.7 % of respondents chose adaptive mechanisms, and 37.3 % chose maladaptive ones. Regarding behavioral coping strategies, adaptive coping strategies were typical for 41.1 % of respondents, 36.3 % revealed maladaptive strategies, while only 22.6 % of respondents used adaptive strategies.

2. The median level of anxiety among the participants of the study was 7 (4; 11) points with a statistically significant difference between men and women. Expressed anxiety was observed in 34.1 % of respondents, including 17.1 % of men and 38.9 % of women. The median stress level among the study participants was 5 (4; 7) points, with statistically significant differences between men and women. Expressed stress was present in 75.5 % of the subjects, including 55.7 % of men and 81.1 % of women.

3. It has been found that adaptive emotional strategies reduce the probability of having severe anxiety, while maladaptive emotional strategies increase this risk by 2.79 times. Cognitive and behavioral strategies did not affect the probability of the onset of severe anxiety during martial law.

4. Interventions aimed at reducing anxiety and, as a result, mental and psychosomatic disorders should be focused on increasing the use of adaptive coping strategies.

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