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Natalia ANDRUSYSHYN

Ph.D. in Economics, Senior Research Fellow, Department of Problems of Social and Humanitarian Development of the Regions, Dolishniy Institute of Regional Research of the National Academy of Sciences of Ukraine

ORCID: 0000-0002-2673-3347

Mariana BAS-YURCHYSHYN

Ph.D. in Economics, Deputy Director, Institution «Regional Development Agency of Lviv Region»

ORCID: 0000-0003-0095-7681

Yulian KONECHNYI

Doctor of Philosophy, Associate Professor at the Department of Microbiology, State Nonprofit Enterprise «Danylo Halytsky Lviv National Medical University»

ORCID: 0000-0003-4789-1675

Iryna TYMECHKO

Doctor of Sciences in Economics, Senior Research Fellow, Department of Regional Financial Policy, Dolishniy Institute of Regional Research of the National Academy of Sciences of Ukraine

ORCID: 0000-0002-7022-9412

REGIONAL CONVERGENCE OF PSYCHOLOGICAL DISTRESS AMONG UKRAINIAN YOUTH: AN ANALYSIS OF 2023–2024 SURVEY DATA

Objective. The aim of this study is to analyze the changes in the mental health of young people living in the Lviv region during the war in Ukraine, compared to other regions of the country, and to propose hypotheses regarding the cause-and-effect relationships of the deterioration of mental health problems among Ukrainian youth.

Methods. This quantitative ecological study analyzed publicly available U-Report youth survey data from 2023–2024. To assess population-level psychological distress, custom indices were methodologically developed to quantify and compare the prevalence and intensity of self-reported anxiety and depression symptoms across Ukraine's regions. The participants were predominantly young people aged 15–34.

Results. The findings contradict the hypotheses of psychological adaptation or geographical protection. Instead, the results indicate a universal deterioration of mental health. In the relatively safe Lviv region, for instance, the cumulative share of youth reporting symptoms of anxiety rose from 53% in September 2023 to 58% by October 2024, with those experiencing constant anxiety increasing from 9% to 15%. This trend led to a significant convergence of psychological distress levels, narrowing the gap between western and front-line regions.

Conclusions. The study concludes that war-related stress is a pervasive, nationwide phenomenon. This escalating mental health crisis is inextricably linked to educational disruptions and signals a future public health burden from stress-related non-communicable diseases. There is an urgent need for integrated, nationwide support systems.

Key words: mental health, adolescents, war in Ukraine, regional disparities, anxiety, depression, psychological distress, non-communicable diseases, adaptation.

Наталія Андрусишин, Мар'яна Бас-Юрчишин, Юліан Конечний, Ірина Тимечко. РЕГІОНАЛЬНА КОНВЕРГЕНЦІЯ ПСИХОЛОГІЧНОГО СТРЕСУ СЕРЕД УКРАЇНСЬКОЇ МОЛОДІ: АНАЛІЗ ДАНИХ ОПИТУВАНЬ 2023–2024 РОКІВ

Метою цього дослідження є аналіз змін у психічному здоров'ї молоді Львівської області під час війни в Україні порівняно з іншими регіонами країни та висунення гіпотез щодо причинно-наслідкових зв'язків погіршення психічного здоров'я серед української молоді.

Матеріали та методи. Це кількісне екологічне дослідження проаналізувало загальнодоступні дані молодіжного опитування U-Report за 2023–2024 роки. Для оцінки рівня психологічного стресу на популяційному рівні були розроблені спеціальні методичні індекси для кількісного вимірювання та порівняння поширеності й інтенсивності симптомів

тревоги та депресії, про які молодь повідомляла самостійно в різних регіонах України. Учасниками були переважно молоді люди віком 15–34 роки.

Результатами. Отримані результати суперечать гіпотезам про психологічну адаптацію або географічний захист. Натомість, вони вказують на загальне погіршення психічного здоров'я. Наприклад, у відносно безпечної Львівській області сукупна частка молоді, яка повідомляла про симптоми тривоги, зросла з 53% у вересні 2023 року до 58% до жовтня 2024 року, а кількість тих, хто відчував постійну тривогу, збільшилася з 9% до 15%. Ця тенденція призвела до значної конвергенції рівнів психологічного стресу, зменшивши розрив між західними та прифронтовими регіонами.

Висновки. Дослідження доводить, що пов'язані з війною стрес є повсюдним, загальнонаціональним явищем. Ця криза психічного здоров'я нерозривно пов'язана з порушеннями в освіті та є сигналом майбутнього тягара для системи охорони здоров'я через пов'язані зі стресом неінфекційні захворювання. Необхідні інтегровані загальнонаціональні системи підтримки.

Ключові слова: психічне здоров'я, підлітки, війна в Україні, регіональні відмінності, тривога, депресія, психологічний стрес, неінфекційні захворювання, адаптація.

Introduction. Adolescence is a critically important, sensitive period for psychosocial, cognitive, and biological development [1]. Armed conflict is one of the most profound environmental disruptions a young person can experience, derailing normative developmental trajectories [2]. War should be understood as a source of both acute (Type I) and chronic, prolonged (Type II) trauma, leading to a wide spectrum of biopsychosocial disorders rather than just isolated conditions. In a global context, over 250 million children live in conflict zones, facing disruptions to basic needs such as food, water, shelter, and, critically, education [3–5].

The full-scale invasion of Ukraine should be viewed as a population-level Adverse Childhood Experience (ACE). Like other ACEs, this experience is linked to long-term negative consequences for health, opportunity, and well-being [6]. To illustrate the scale of educational disruption in Ukraine, which is a critical backdrop for the psychological data in this study, key statistics are essential. Millions of children face barriers to accessing education, thousands of schools have been damaged or destroyed, and a significant portion of students rely on unstable online learning [7,8]. This directly relates to the "Education" component of the journal's focus. Furthermore, the scale of displacement is staggering: 16% of 2022 high school graduates were displaced, and many abandoned the path to higher education altogether [9]. This highlights the immediate impact on the nation's human capital.

The existing literature confirms that mental health is one of the most significant long-term problems caused by war, indicating a prevalence of post-traumatic stress disorder (PTSD) and other mental disorders [10–12]. Studies conducted in Ukraine since the full-scale invasion support these findings, showing high rates of PTSD, anxiety, and depression among youth, which aligns with the premises of this work [13]. Some research indicates a "dose-response" relationship, where a higher number of traumatic events predicts more severe psychopathology, providing a theoretical basis for understanding why front-line regions initially had worse outcomes [2].

However, the question of how geographical distance from a combat zone affects mental health

in a modern war-characterized by long-range weaponry and pervasive informational influence—remains under-researched. This creates the central theoretical tension for this study. On one hand, there are concepts of psychological adaptation and resilience, which suggest that over time, individuals can adjust to stressful conditions.⁴ On the other hand, the concept of allostatic load—the "wear and tear" on the body from chronic stress leading to physiological dysregulation—suggests that prolonged stress, even at low intensity, accumulates and causes harm [1]. Thus, this study serves as an empirical test of which of these processes is dominant in the Ukrainian context.

The aim of this manuscript is to study the changes in the mental health of young people living in the Lviv region during the war in Ukraine, compared to other regions of the country.

To propose hypotheses regarding the cause-and-effect relationships of the deterioration of mental health problems among Ukrainian youth during the war. Research Hypotheses:

I. Psychological vulnerability during the war decreases as a result of people's adaptation to constant stress, especially in regions distant from the front line.

II. The intensity of war-related mental health problems among youth decreases with increasing distance from combat zones.

Methods. This study employed several methods, including sociological surveys to reach a larger number of people, statistical methods to test the similarity of data across different regions of Ukraine, an index method to calculate special indicators, an induction method to generalize the results, and a cartographic method to create maps of the findings.

Specifically, the results of several voluntary sociological surveys of youth from the U-Report initiative were used. These included nationwide surveys from February 2023 and July 2023 1, September 2023 22, and October 2024 [14–16]. A regional survey of youth in the Lviv region from March-April 2025 was also included [17]. Some questions were repeated in surveys at different times, allowing for the examination of changes over time and

the identification of trends. To achieve the article's goal, only the responses of respondents from the Lviv region were selected for detailed analysis. Each survey involved over 500 people, except for the survey on psychological state, which had 337 participants. The age of the respondents varied slightly across studies, but predominantly 80% (plus or minus 5%) were between 15 and 34 years old. Regarding gender, in all surveys, the number of women was three or more times higher than the number of men, which is expected in wartime conditions as women are significantly more active in rear regions.

The surveyed age range (predominantly 15–34) is particularly relevant as it covers adolescents in their final years of secondary education, students in vocational and higher education, and young adults in the critical early stages of their careers, all of whom are profoundly affected by educational and economic disruptions.

To assess the prevalence and intensity of symptoms of affective mental health disorders among youth, the index method was used. This method utilized quantitative data from respondents' self-assessments. They answered the question: "How often in the last few weeks have you felt excessive anxiety/panic (or indifference to things or activities you usually like)? Please rate on a scale from 1 to 5, where 1 is never and 5 is constantly." While this index method is not a clinical diagnostic tool, it is a valid and reliable approach for population-level monitoring and comparing the relative level of distress between regions and over time, which is the primary goal of this ecological study.

The methodology for calculating the conditional coefficients of the prevalence of mental health disorder symptoms (based on feelings of anxiety and depression) involves finding a weighted sum. This is done by multiplying the proportion of respondents for each rating (from 1 to 5) by the corresponding coefficients (from 0 to 4) according to formula 1:

$$K_D = \sum_{i=1}^5 (i - 1) * k_{i,1} \quad (1)$$

where: i – respondent's self-assessment of the frequency of feeling excessive anxiety (apathy/depression);

$k_{i,1}$ – proportion of respondents who assessed the frequency of feeling with score i .

The values of conditional coefficients of prevalence of symptoms of affective disorders vary from 0 to 4, where:

0 means that no respondents felt these symptoms in the last few weeks.

4 means that all respondents constantly felt symptoms of affective disorders and could not cope with them on their own.

The conditional coefficient of the intensity of mental health disorders among youth was also calculated using the index method. It included only the proportion of respondents who often or constantly felt anxiety or had depressive states (ratings of 4–5 on the frequency scale). Its value ranges from 0 to 2, where 0 means that no clinically significant signs were found among those surveyed, and 2 means the maximum possible intensity of disorders, where all respondents reported the constant presence of both symptoms simultaneously.

During the preparation of this manuscript, the authors (Y.K.) used generative artificial intelligence (Gemini from Google) to search and summarize the literature, as well as to assist in reviewing and editing the manuscript. The initial analysis and writing of the draft manuscript text was carried out by the authors without the use of AI. The authors reviewed and edited all edits, results generated by AI, and bear full responsibility for the final content of this publication. The authors would also like to express their sincere gratitude to the Armed Forces of Ukraine for their courage and defense of the country, which made this research possible.

Results. As early as June 2022, a rapid audit of public mental health services showed that about 15 million Ukrainians would have mental health problems and would need psychological support, and 3–4 million people would need medical treatment. According to WHO estimates for armed conflicts worldwide, "10% of people who experience traumatic events will have serious mental health problems, and another 10% will develop behavior that will stop them from functioning effectively. The most common conditions are depression, anxiety, and psychosomatic problems such as insomnia or back and stomach pain." The results of many studies indicate an increase in stress and anxiety levels among the population, as well as a constant growth in the number of people with PTSD. It has been clinically established that in patients with PTSD, mental health indicators normalize more slowly than physical ones.

According to sociological research during the first year of the full-scale war, only 7% of respondents from the Lviv region reported an improvement in their psycho-emotional state. At the same time, more than 65% of those surveyed noted that it had worsened. Young people under 19 showed a particular adaptive reaction: 26% of respondents in this age group could not determine how their emotional state had changed since the beginning of the full-scale invasion.

One year after the start of the war, 52% of study participants described their psycho-emotional state as anxious, which may indicate chronic psycho-emotional tension. In July 2023, after the survey questions were

expanded, 28% of respondents reported constant anxiety, and another 29% were in a state of chronic stress. In total, 57% showed symptoms that could be indicative of mental health disorders. In September of the same year, there was a growth in long-term and intense signs of emotional maladjustment: 9% of respondents reported constant anxiety or panic that they could not handle on their own (another 18% felt it often, and 26% periodically). 11% reported persistent signs of apathy or depression, which included a loss of interest in usual activities. In total, 53% of respondents felt symptoms of anxiety disorders periodically or more often (Figure 1).

The following year (October 2024) saw a further intensification of symptoms: the proportion of respondents who constantly felt anxiety or panic in recent weeks increased to 15%, while the cumulative share (those who periodically or more frequently had symptoms of anxiety disorders) rose to 58%. The number of individuals constantly in a state of apathy or depression grew to 12%, indicating a growing need for qualified psychosocial assistance and a wider

prevalence of mental health disorders among the population. The indicator's value in the Lviv region is almost at the average level among all surveyed regions of the country (Table 1).

Conditional indicators of the prevalence of mental health disorder symptoms were calculated for 23 regions of Ukraine and the city of Kyiv. In September 2023, the lowest values of the conditional anxiety indicator were recorded in the Zakarpattia (1.4), Chernivtsi (1.5), and Ivano-Frankivsk (1.6) regions – regions distant from the front line. Conversely, the highest values were observed in the Mykolaiv (2.3), Sumy (2.2), and Zaporizhzhia (2.1) regions – areas with increased risk.

The values of the conditional indicator for the intensity of affective mental health disorders among youth (Appendix A2) ranged from 0.39 to 0.80 in 2023 and from 0.51 to 0.78 in 2024. The value of the conditional indicator for the intensity of mental health disorders among the youth of Lviv region increased from 0.58 in 2023 to 0.63 in 2024, which is practically in line with the national average (Table 2).

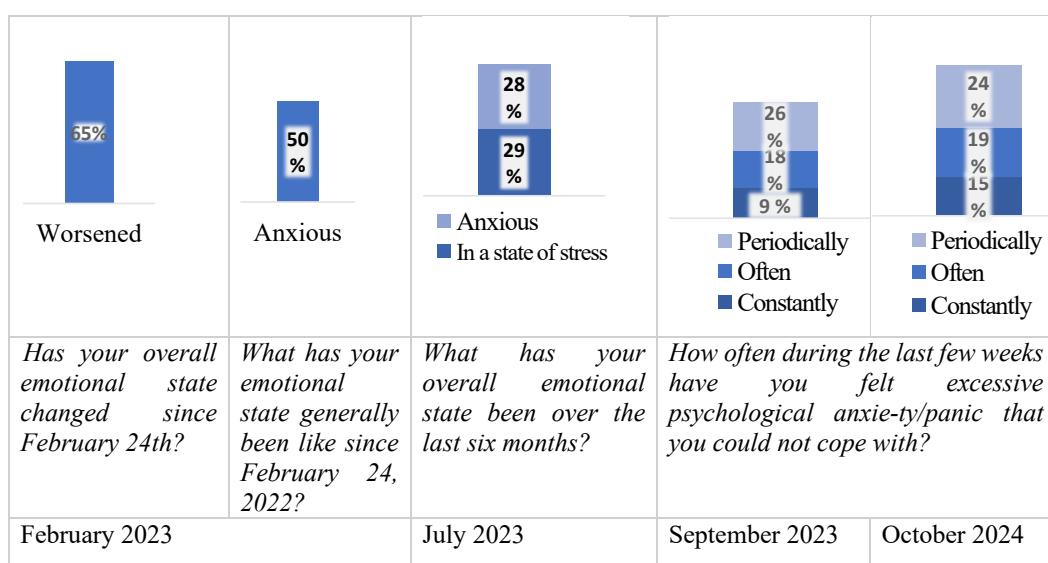


Fig. 1. Self-assessment of the emotional state of Lviv region's youth during the war, and the prevalence of anxiety symptoms

Conditional indicators of the prevalence of affective mental health disorder symptoms among the youth of Lviv region and a statistical description of the corresponding values in the regions of Ukraine (September 2023, October 2024)

Indicator	Anxiety 2023	Anxiety 2024	Depressiveness 2023	Depressiveness 2024
Lviv region	1.9	2.0	1.9	2.0
Average for the regions of Ukraine	1.8	1.9	1.9	1.9
Minimum value	1.4	1.7	0.9	1.6
Maximum value	2.3	2.1	2.0	2.1
Variation range	0.9	0.4	1.1	0.5
Standard deviation	0.194	0.110	0.203	0.134
Coefficient of variation, %	10.52	5.72	10.96	7.26

Table 1

Table 2

Conditional indicators of the intensity of mental health disorders among the youth of the Lviv region and a statistical description of the corresponding values in the regions of Ukraine (September 2023, October 2024)

Indicator	<i>Intensity of mental health disorders among youth</i>	
	2023	2024
Lviv region	0.58	0.63
Average for the regions of Ukraine	0.63	0.64
Minimum value	0.39	0.51
Maximum value	0.8	0.78
Variation range	0.41	0.27
Standard deviation	0.0899	0.0757
Coefficient of variation, %	14.6	11.8

The visualization demonstrates a reduction in regional differentiation: in 2023, a greater contrast was observed between the rear and frontline regions, whereas in 2024, the intensity of disorders increased in the western regions and leveled out across the country (Figure 2).

Figure 2. Geographical distribution of the intensity of mental health disorders among youth in the regions of Ukraine in 2023 and 2024. The closer to the east (to the gray zones), the closer to the front line.

Discussion. The presented results directly refute both of the study's initial hypotheses. The data support neither the idea of psychological adaptation to long-term stress nor the assumption that geographical distance from the front line provides significant protection for mental health. Instead, the key finding is a convergence of psychological distress levels across the country, driven by a worsening situation in the western regions. This demonstrates that the psychological impact of modern warfare, conducted with long-range

weapons and accompanied by intense informational pressure, is pervasive and not confined by geographical boundaries.

The explanation for this convergence extends beyond the direct impact of combat. Several interconnected factors must be considered. First, secondary traumatization plays a significant role. The constant flow of news, social media images, and personal stories from displaced persons creates a form of vicarious trauma that affects the population even in distant regions [13]. Second, there is a disruption of protective routines. Even in "safe" regions, the stress of air raid sirens, displacement, and uncertainty disrupts the normal fabric of life, including school attendance, socializing with friends, and community involvement, which are vital for adolescent well-being.¹ Third, losses are nationwide. Military casualties are not geographically selective; families in every region experience the death of loved ones, which is a primary driver of distress. Thus, the war creates a unified

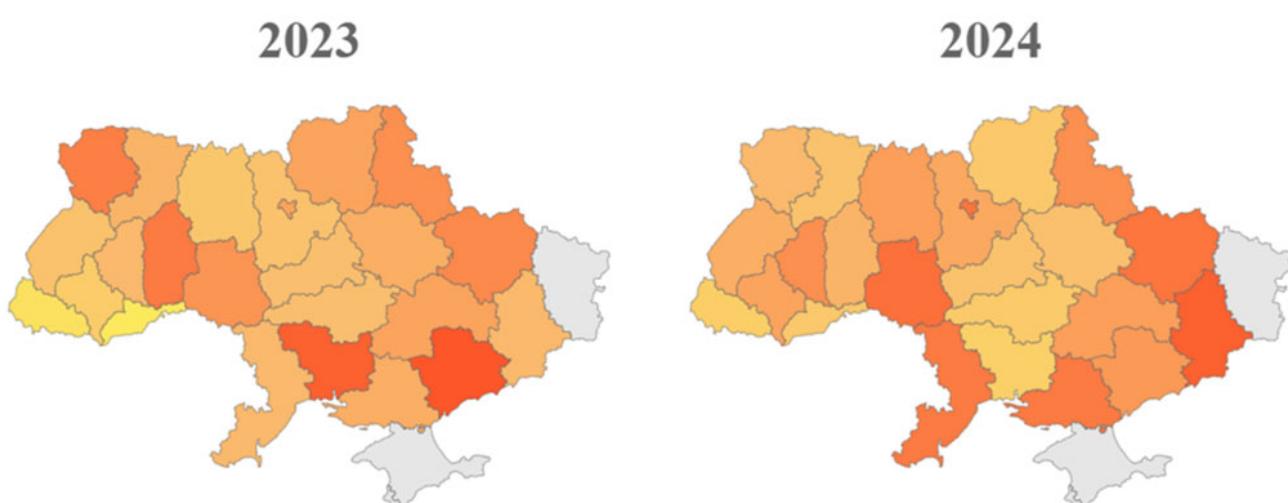


Fig. 2. Geographical distribution of the intensity of mental health disorders among youth in the regions of Ukraine in 2023 and 2024. The closer to the east (to the areas in gray), the closer to the front line

psychological space of stress that encompasses the entire country.

The rising levels of anxiety, depression, and apathy documented in this study do not occur in a vacuum. They unfold against the backdrop of a profound and simultaneous educational crisis, and these two phenomena are mutually reinforcing. The mental states measured are fundamentally incompatible with effective learning. Numerous studies confirm that war-related psychological distress in students leads to decreased concentration, motivation, and academic performance.

Conversely, the disruption of the educational process itself is a powerful stressor. The shift to often unstable online learning, constant interruptions from air raids and power outages, and the loss of the social environment of school are significant sources of anxiety and frustration for students.⁹ This creates a "negative feedback loop": poor mental health impairs the ability to learn, and the difficulties of learning under wartime conditions exacerbate mental health problems. The data from this study provide a powerful quantitative measure of one side of this destructive cycle, underscoring that the recovery of the educational process is impossible without simultaneously addressing the mental health of the youth.

The widespread psychological distress documented in this study should be viewed not only as a psychological or educational problem but also as a harbinger of a future nationwide public health crisis related to non-communicable diseases (NCDs). Chronic stress and anxiety in adolescence trigger a cascade of biological changes, including dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and sustained activation of the sympathetic nervous system. This leads to elevated cortisol levels and systemic inflammation, a process known as the biological embedding of stress.

A vast body of scientific literature links these physiological changes to long-term health consequences. First, anxiety is an independent risk factor for cardiovascular diseases (CVD), including hypertension, coronary heart disease, and stroke [18]. Second, depression and stress are closely correlated with metabolic syndrome, obesity, and type 2 diabetes. Third, chronic stress can suppress the immune system, increasing vulnerability to infections and, potentially, to cancer.

Thus, the data from this study serve as an early warning signal of a future public health catastrophe. The mental health crisis of today is likely laying the foundation for the physical health crisis of tomorrow for an entire generation of Ukrainians. Ignoring these signals now could lead to enormous social and economic costs in the future.

The limitations of using self-report survey data and a cross-sectional study design must be acknowledged.

While these methods are effective for rapid population-level assessment, they cannot establish causal relationships with the same certainty as longitudinal studies.

Future research should build on the findings of this work. Longitudinal cohort studies are needed to track this cohort of Ukrainian youth over decades to monitor the actual incidence of mental and physical disorders. Second, quantitative data should be supplemented with mixed-methods research, including qualitative methods (interviews, focus groups), to gain a deeper understanding of the lived experiences of students and educators during the war. Third, future studies should include the integration of biomarkers—objective physiological measures of stress (e.g., hair cortisol, inflammatory markers like C-reactive protein) – to confirm the link between self-reported psychological distress and its biological embedding.

Conclusions. This study refutes common assumptions about the psychological impact of war. First, the data show that the psychological impact of the war is a national, not a regional, phenomenon, and it worsens over time, contradicting hypotheses of adaptation. Psychological distress in rear regions is increasing, approaching the levels of front-line zones. Second, this widespread mental distress is inextricably linked to the ongoing disruption of the educational system and is a significant risk factor for the future physical health of the country's youth.

Compliance with ethical requirements. This is a quantitative study based on a secondary analysis of data rather than the direct involvement of participants. The methodology complies with ethical standards, as the authors exclusively used publicly available datasets from youth surveys conducted by the U-Report initiative. The U-Report initiative granted permission for the use of the data for scientific purposes. Obtaining informed consent from respondents directly by the authors of this manuscript was not required. However, the authors of the manuscript were the commissioners of some of the U-Report surveys. The ethical responsibility for the primary data collection, including obtaining consent and ensuring anonymity, belonged to the organizers of the initial surveys.

Data Availability Statement: The study is based on the analysis of publicly available datasets. The original survey data can be found at the official U-Report Ukraine portals: [14-17]. The derived datasets generated and analyzed during the current study, including the conditional indicators and statistical calculations, are presented directly within this article in Table 1, Table 2, and Appendix tables 1 and 2.

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the preparation of this manuscript, the author (Y.K.) used Google's Gemini AI for the purpose of assisting with and verifying the English translation. The authors have reviewed and edited the output and take full responsibility for the content of this publication. The AI was not used for text generation, data analysis, or any other core scientific purposes of this study.

Abbreviations

The following abbreviations are used in this manuscript:

PTSD: Post-Traumatic Stress Disorder

WHO: World Health Organization

USA: United States of America

Appendix A

Appendix A.1

Table A1

Conditional indicators of the prevalence of symptoms of affective mental health disorders (anxiety and depressiveness) among the youth of Ukraine in 2023 and 2024, depending on their region of residence*

Region of Ukraine	Anxiety		Depressiveness	
	2023	2024	2023	2024
1	2	3	4	5
Vinnytsia	2.1	2.1	1.9	2.0
Volyn	2.0	1.8	2.0	1.7
Dnipropetrovsk	1.9	2.0	1.9	1.8
Donetsk	1.9	2.1	1.9	2.0
Zhytomyr	1.7	1.9	1.8	1.8
Zakarpattia	1.4	1.8	1.9	1.6
Zaporizhzhia	2.1	1.9	2.0	1.9
Ivano-Frankivsk	1.6	2.0	1.9	1.9
Kyiv Oblast	1.8	1.9	1.9	1.8
Kropyvnytska	1.7	1.7	1.8	1.7
Lviv	1.7	1.9	1.9	1.9
Mykolaiv	2.3	1.7	2.0	1.7
Odesa	2.0	2.1	1.9	1.9
Poltava	1.8	1.8	1.9	1.7
Rivne	1.8	1.8	1.8	1.6
Sumy	2.2	1.9	1.7	2.1
Ternopil	1.8	2.0	1.9	1.8
Kharkiv	1.9	2.1	2.0	1.9
Kherson	1.9	1.9	1.8	2.0
Khmelnytskyi	1.9	1.9	2.0	1.9
Cherkasy	1.8	1.9	1.8	1.8

Continuation table A1

1	2	3	4	5
Chernivtsi	1.5	2.0	1.7	1.8
Chernihiv	1.9	1.8	0.9	1.7
Kyiv city	1.9	2.0	1.9	2.0

*Data for the Autonomous Republic of Crimea and Luhansk Oblast were not included due to the lack of representative information related to the occupation of these territories as of 2023–2024.

Appendix A.2

Table A2
Conditional indicators of the intensity of mental health disorders among young people in Ukraine in 2023 and 2024, depending on their region of residence*

Region of Ukraine	2023	2024
Vinnytsia	0.68	0.75
Volyn	0.72	0.61
Dnipropetrovsk	0.65	0.66
Donetsk	0.61	0.78
Zhytomyr	0.56	0.66
Zakarpattia	0.43	0.52
Zaporizhzhia	0.8	0.67
Ivano-Frankivsk	0.53	0.65
Kyiv Oblast	0.58	0.64
Kropyvnytska	0.6	0.54
Lviv	0.58w	0.63
Mykolaiv	0.78	0.51
Odesa	0.61	0.73
Poltava	0.63	0.59
Rivne	0.62	0.58
Sumy	0.69	0.69
Ternopil	0.61	0.69
Kharkiv	0.7	0.74
Kherson	0.63	0.73
Khmelnytskyi	0.73	0.62
Cherkasy	0.6	0.58
Chernivtsi	0.39	0.55
Chernihiv	0.65	0.55
Kyiv city	0.65	0.74

*Data for the Autonomous Republic of Crimea and Luhansk Oblast were not included due to the lack of representative information related to the occupation of these territories as of 2023–2024.

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