

HEALTH AND PHYSICAL ACTIVITY OF UKRAINIANS DURING A FULL-SCALE WAR WITH RUSSIA

ЗДОРОВ'Я ТА РУХОВА АКТИВНІСТЬ УКРАЇНЦІВ ПІД ЧАС ПОВНОМАСШТАБНОЇ ВІЙНИ З РОСІЄЮ

Vorobiova A. V.^{1,2}, Vasylenko M. M.², Schilling R.¹

¹University of Basel, Basel, Switzerland

²National University of Ukraine on Physical Education and Sport, Kyiv, Ukraine

¹ORCID: 0000-0001-9542-345X

²ORCID: 0000-0001-6086-1804

³ORCID: 0000-0002-6920-4883

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Abstracts

Objective – to investigate the effects of war in Ukraine on the physical activity and health of the population.

Material. The survey was conducted in 2023 in two stages. The study involved 572 participants, and data from 394 questionnaires were analysed. The respondents were 311 women and 84 men aged 18 to 76 years (mean age: 35.2±13,0 years). 66.2% of respondents were in Ukraine at the time of the survey, including 9.9% of internally displaced persons. 33.8% of the respondents were outside Ukraine. The study included assessment methods for PTSD symptoms, depression, stress perception, stress resistance, pain level, sleep disturbance, physical activity level, physical fitness, and a general factors questionnaire.

Results. Analysis of the distribution of participants according to various criteria in absolute and relative values allowed us to determine the level of physical and mental health of Ukrainians. Symptoms of PTSD and depression are more common among women. After 1.5 years of full-scale war, symptoms of PTSD and depression, stress resilience decreased, but the perception of stress increased. After the outbreak of full-scale war, more than half of Ukrainians reported sleep problems, panic attacks became more frequent, and the number of acute respiratory and chronic diseases increased. Ukrainians began to experience pain in various parts of the body more frequently, although 1.5 years after the start of full-scale war, the pain became chronic for most.

Conclusions. The general state of physical and mental health of Ukrainians has deteriorated significantly since the outbreak of full-scale war by Russia against Ukraine. These effects are interdependent, and in the next article we will consider the effects of war-related stress on the health and physical activity of Ukrainians.

Key words: physical health, mental health, physical activity, stress, depression, PTSD, pain, war.

Мета – дослідити вплив воєнних подій в Україні на здоров'я та рухову активність населення.

Матеріал. Опитування проведено у 2023 році у два етапи. У дослідженні взяли участь 572 респонденти, для аналізу даних використані результати 394 опитувальників. Серед респондентів – 311 жінок і 84 чоловіки віком від 18 до 76 років (середній вік – 35,2±13,0 року). 66,2% опитаних на момент опитування були в Україні, з них 9,9% – внутрішньо переміщені особи, 33,8% опитаних перебували за межами України. Дослідження включало методи для визначення симптомів ПТСР, депресії, сприйняття стресу, стресостійкості, рівня болю, порушення сну, рівня рухової активності, фізичної підготовленості та загальний опитувальник факторів впливу.

Результати. Аналіз розподілу учасників за різними критеріями у абсолютних та відносних величинах дозволив визначити рівень фізичного та психічного здоров'я українців. Симптоми ПТСР та депресії частіше проявляються у жінок. Через 1,5 року повномасштабної війни симптоми ПТСР та депресії, стійкість до стресу знизились, але сприйняття стресу збільшилось. Після початку повномасштабної війни більше половини українців зазначили, що мають проблеми зі сном, частіше почали проявлятися панічні атаки, збільшилась кількість як гострих респіраторних, так і хронічних

захворювань. Українці частіше почали відчувати біль у різних частинах тіла, хоча через 1,5 року після початку повномасштабної війни біль перейшов у більшості у хронічну форму.

Висновки. Загальний стан як фізичного, так і ментального здоров'я українців значно погіршився після початку повномасштабної війни Росії проти України. Цей вплив є взаємозалежним, тому в наступній статті ми розглянемо вплив стресу, спричиненого війною, на здоров'я та рухову активність українців.

Ключові слова: фізичне здоров'я, психічне здоров'я, рухова активність, стрес, депресія, ПТСР, біль, війна.

Introduction. It is widely acknowledged that war inflicts suffering upon civilians residing in the conflict zone, severely limiting their ability to meet basic human needs and prioritising self-preservation. Ukrainians have been enduring the consequences of Russian aggression for a decade, since 2014. Throughout this period, there have been multiple instances of people being displaced due to Russia's military aggression and relocating to safer areas.

As of the beginning of 2024, the population of Ukraine is 34.9 million people, according to the Ptukha Institute of Demography and Social Studies of the National Academy of Sciences of Ukraine [24]. The number of internally and externally displaced persons is constantly changing. As of 25th September 2023, there were 3.7 million internally displaced persons registered in Ukraine. Of these 52% are located in five regions of Ukraine. As of 15th February 2024, nearly 6.5 million Ukrainians were registered as refugees in other countries, with 6 million in European countries. Meanwhile, 20.6% of Ukrainians who travelled abroad remained in border countries such as Poland, the Republic of Moldova, Romania, Slovakia, and Hungary. Statistics show that around 300 000 Ukrainians returned from abroad but remained internally displaced, with 39% of them reporting partial or complete destruction of their houses. On average, they spent 141 days abroad. This means that approximately half of them spent less than three months in another country [13].

Military actions have a detrimental effect on both the mental and physical health of the population, leading to a significant burden on the healthcare systems of a country.

The most prevalent chronic non-communicable diseases in Ukraine are cardiovascular diseases, which account for 65% of deaths [41], and

diabetes mellitus, which affects 7.1% of the population [12]. Ukraine has one of the highest rates of HIV [34] and tuberculosis [37] among infectious diseases in Europe. As of 13 of May 2022 18.2% of the 8.63 million internally displaced persons had cardiovascular disease, 4.2% – diabetes, 0.7% – cancer, 0.6% – HIV, and 0.1% – tuberculosis [26].

A study conducted in the Mykolaiv region of Ukraine during Russia's full-scale invasion of Ukraine confirmed that stress has a negative impact on the worsening of symptoms of chronic non-communicable diseases. Since the beginning of the war, there has been a 1.8 times increase in visits to patients with stage I hypertension, a 2 times increase – stage II hypertension, and a 2.5 times increase – stage III hypertension [17]. The health of individuals with diabetes mellitus deteriorated, and there was an increase in complaints related to somatic disorders, particularly gastrointestinal and asthenic symptoms.

It should be noted that bomb shelters, where Ukrainians spend long periods of time due to Russia's constant air attacks throughout Ukraine, often have poor lighting, lack of sunlight, high humidity, low temperature, poor air ventilation, limited space, poor sanitary conditions, and limited access to drinking water and quality nutritious food [10]. These conditions can exacerbate chronic diseases and musculoskeletal disorders. In a study of adolescent girls who spent time in the occupation, it was found that 65.8% experienced menstrual disorders due to stress, limited physical activity, and eating disorders [25]. These disorders may have a negative impact on the reproductive health of the younger generation.

The incidence of cancer among Ukrainians is a growing concern, as timely treatment and

diagnosis are not always available in some regions of Ukraine. Additionally, Russia's use of various types of weapons in massive attacks negatively affects the environment, polluting the air and water with radioactive substances. This may further impact the health of the population not only in Ukraine but also in neighbouring countries. According to reports, there has been an increase in the number of cancer patients in the temporarily occupied territories and among military personnel. However, obtaining official information is currently difficult due to limited diagnostic capabilities in the current conditions.

In Ukraine, access to medical services is limited due to the displacement of the population, an increase in the number of military and civilian war injuries, and the destruction of medical infrastructure in many cities as a result of Russia's air attacks. Reports indicate that as of 24 February 2024, there have been 1603 attacks on healthcare facilities in Ukraine [38]. As of 5 February 2024, the Ministry of Health reported that 1523 healthcare facilities in Ukraine had been damaged, with 195 being completely destroyed. Over the past two years, 502 healthcare facilities have been fully restored, and 362 have been partially restored [23]. Access to healthcare has been hindered by rising drug prices, poverty, and cuts in healthcare budgets. Furthermore, there is a shortage of medical staff, particularly in clinical psychology and physiotherapy [1].

The health status of Ukrainians who have been displaced to Europe was commonly affected by a range of factors including upper respiratory tract infections (due to low temperatures and long journeys to host countries), exhaustion, psychosomatic stress reactions (headaches, tremors), gastrointestinal disorders (diarrhoea, vomiting), cardiovascular diseases (hypertension, arrhythmia), chronic diseases (diabetes, cancer), and disability [20].

During the first four months, a total of 1494 children and 736 adult Ukrainians were hospitalized in Poland. The primary reasons for women seeking medical attention were pregnancy and the postpartum period (39.4%) and neoplasms (18.6%). Men, on the other hand, most commonly sought care for cardiovascular

system diseases (26.0%), injuries, and poisoning (21.5%). The study of refugees found that children were most commonly affected by infectious and parasitic diseases (35.5%), unclassified symptoms (16.9%), and respiratory system diseases (12.2%) [19]. Elderly refugees had an average of 2.5 chronic diseases per person, with cardiovascular, gastrointestinal, respiratory, and musculoskeletal diseases being the most common [28].

During the initial three months of the full-scale invasion, 2,500 Ukrainians in Italy sought medical care. The primary reasons for seeking medical attention were diseases of the circulatory system (8.2%), endocrine system (4.0%), digestive system (1.0%), and mental and behavioural disorders (1.0%) [27]. Other people mostly sought vaccination.

German doctors have reported encountering communication issues with patients from Ukraine, including a lack of information regarding their medical history and prescribed treatment, previous illnesses. Differences in healthcare systems have also been noted. Moreover, patients' expectations may not align with the proposed treatment regimens due to variations in examination and treatment protocols between countries, as well as a lack of medications that are familiar or prescribed by Ukrainian doctors. Additionally, treating these patients may require more time [32].

In conclusion, we can identify the issue of declining health among Ukrainians during the Russian invasion of Ukraine. Our study primarily examines the long-term effects of prolonged stress on the physical and mental health of Ukrainians.

Aim. The aim of this study is to investigate the impact of war in Ukraine on the health and physical activity of the population. A comparison was made between the physical and mental health, physical fitness, and physical activity of Ukrainians before the start of the full-scale invasion and 1–1,5 years later.

Hypothesis. The hostilities in Ukraine have caused significant stress, leading to a decline in both the mental and physical health of the population.

Material and methods.

Description of the design. The study is based on a quantitative design. It consists of two phases: the first phase was conducted one year after Russia's full-scale invasion of Ukraine began (February–July 2023); the second phase took place six months after the first phase (August 2023–January 2024).

The research was conducted through an online questionnaire on the RedCap platform. The survey comprised a general questionnaire and a set of psychological and sociological methods, and lasted 15–20 minutes. Participation was voluntary and participants were not compensated monetarily. They were free to withdraw at any time without providing a reason. Additionally, they had the option to save the return code and resume the survey later.

The link was shared with Ukrainians who were either in Ukraine or abroad during the research. We contacted participants through various social networks, including Facebook and Instagram, as well as messaging platforms like Viber and Telegram. They were then directed to our survey page via email. Our survey page provided comprehensive information about the study.

Since the survey potentially include questions about traumatic experiences, participants were provided with information about obtaining qualified psychological help in Ukraine, abroad or online.

Ethics Approval. The study was approved by the Ethics Committee of the Department of Psychology at the University of Basel, Switzerland (application number: 022-22-3 (amendment), 28.06.2023) and the Commission on Biomedical Ethics of the National University of Ukraine on Physical Education and Sport (Minutes No. 3, 26.09.2022). All participants confirmed their familiarity with the informed consent and their compliance with the inclusion criteria, which require being over 18 years old, living in Ukraine at the beginning of February 2022, and having the ability to read Ukrainian, before commencing any study procedures.

Description of the inclusion criteria. The study included adults aged 18 and over who

resided in Ukraine at the start of February 2022 and had sufficient proficiency in the Ukrainian language to comprehend the survey questions.

Participants. A total of 572 participants took part in the survey, with 394 fully completing it. Seven participants who did not meet the inclusion criteria were excluded. The sample consisted of 311 women (78.9%) and 83 men (21.1%), with an average age of 35.2 ± 13.0 (Table 1). The majority of participants were in the second period of middle age. As expected, the study was conducted mainly among women, 38.9% of whom were abroad at the time of the study, reflecting the general trend of population displacement as a result of military operations in Ukraine.

For this study, the participants were divided into groups based on gender (women, men) and the time of participation in the study (1 year and 1.5 years after the start of the full-scale war).

In our study 66.24% of respondents were in Ukraine at the time of the survey. According to the statistics, 15.7% of Ukrainians were forced to go abroad, which means that 84.3% are in Ukraine. A slightly smaller proportion of Ukrainians from the neighboring countries participated in the survey (11.3% of those abroad), but a larger proportion from other European countries. In our survey, 9.9% of IDPs participated, while according to statistical data, 8.9% of internally displaced persons are registered in Ukraine. In general, we can say that the distribution of respondents is in line with the statistical data and that the data obtained can be extrapolated to the whole sample.

According to the basic indicators (age, gender, number of children, level of education, place of residence), there was no significant difference between the group of respondents after 1 year and 1.5 years, which allows us to compare these groups according to the studied indicators of health and physical activity.

Description of the instruments.

Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) in the Ukrainian adaptation [5] has been validated for use in populations from different countries and in different languages [3; 14]. From a maximum possible score of 80, the

Table 1

Participants characteristics for the overall sample

	Female (n=311)		Male (n= 83)		Total Sample (n= 394)	
	n	%	n	%	n	%
<i>Age</i>						
youth period – 18–21 y.o.;	55	17.68	35	42.17	90	22.84
adulthood (1 st period) – 22–35 y.o.;	97	31.19	14	16.87	111	28.17
adulthood (2 nd period) – 36–59 y.o.;	145	46.62	28	33.73	173	43.91
old age – over 60 y.o.	14	4.50	6	7.23	20	5.08
<i>Place of residence at the time of the survey</i>						
Ukraine:	190	61.09	71	85.54	261	66.24
home town	168	54.02	54	65.06	222	56.35
internally displaced	22	7.07	17	20.48	39	9.90
Abroad:	121	38.91	12	14.46	133	33.76
neighboring countries – Poland, Republic of Moldova, Slovakia, Romania, Hungary*	13	4.18	2	2.41	15	3.81
European countries except neighboring countries	96	30.87	7	8.43	103	26.14
all other countries except European	12	3.86	3	3.61	15	3.81
<i>Displacement</i>						
without any migration	81	26.05	29	34.94	110	27.92
returned internally displaced	60	19.29	20	24.10	80	20.30
returned externally displaced	27	8.68	5	6.02	32	8.12
internally displaced	17	5.47	16	19.28	33	8.38
internally displaced returned from abroad	5	1.61	1	1.20	6	1.52
externally displaced	121	38.91	12	14.46	133	33.76

* We had no one participant from Ukrainians, who were displaced into Belarus or russia

threshold total score for a preliminary diagnosis of PTSD symptoms is 38. We used the scale for screening purposes only, not for diagnosis.

Perceived Stress Scale (PSS-4) is a short form of the original scale. The scale has 4 questions about how often participants have experienced stressful situations in the past month. Higher scores correlate with more stress. This test shows a good correlation between stress and health perceptions [36].

The Patient Health Questionnaire (PHQ-9) was used as a self-administered screening tool to assess the severity of depressive symptoms. The PHQ-9 alone is not sufficient to confirm a diagnosis of depression, so we did not use it for diagnosis. The questionnaire assesses how often participants have been bothered by each of 9 symptoms in the past two weeks. The total score of the PHQ-9 ranges from 0 to 27 (scores of 1–4 correspond to ‘normal’ or minimal depression; 5–9 – mild depression; 10–14 – moderate depression; 15–19 – moderately severe depression; 20–27 – severe depression) [6].

The PHQ-9 has good diagnostic validity with comparable sensitivity and specificity for major depression in adult populations [9].

Brief Resilience Scale (BRS) was used for the research in an original short form, consisting of 6 questions, translated into Ukrainian. This scale, together with the Connor-Davidson Resilience Scale and the Resilience Scale for Adults, has the best psychometric properties [40]. We chose the Brief Resilience Scale because it is the shortest. This scale has also been validated in different countries, cultures and languages [7; 18]. According to the interpretation of the scores, the total average shows low (1.00–2.99), normal (3.00–4.30) and high (4.31–5.00) resilience.

Insomnia Severity Index (ISI) measures sleep quality and sleep problems, including insomnia problems. The ISI is a reliable and valid instrument for quantifying perceived insomnia severity, has adequate internal consistency, and is a reliable self-report measure of perceived sleep problems [4]. The ISI includes 7 questions about sleep patterns over the past month. The

total score allows results to be interpreted as: no insomnia (0–7); subthreshold insomnia (8–14); moderate insomnia (15–21); and severe insomnia (22–28).

Visual Analogue Scale for Pain (VAS) is a 100-point horizontal scale where respondents were asked to place a mark on the line representing their current pain intensity from 0 to 100, where 0 is no pain and 100 is severe pain. We used 5 scales to measure the level of pain in the head, back, chest, arms and legs and stomach over the past two weeks. 0 to 4 points can be considered as no pain, 5 to 44 points – mild pain, 45 to 74 points – moderate pain, and 75 to 100 points – severe pain [16]. We chose the VAS to measure pain because it is valid, reliable and provides a more accurate assessment of the level of pain than the Numerical Rating Scale. The limitation of VAS is that the data are not always normally distributed and patients do not always use the full scale [39].

Saltin-Grimby Physical Activity Level Scale (SGPALS) asks participants to rate their level of physical activity in the last 3 months and in the last 3 months before February 2022, choosing one of four options: physically inactive; moderately vigorous physical activity; light physical activity; moderate physical activity; intensive training. Ranking in the SGPALS has positive associations with physical activity measured by accelerometry [30].

Self-Perceived Fitness (SPF) is 10 point visual analogue scale that measures the level of fitness compared to other people of the same age. The scale ranges from 1 (poor fitness) to 10 (excellent fitness). Self-perceived fitness was measured for participants' current level of fitness and for their level of fitness before February 2022. This method is a valid and reliable tool for assessing self-reported physical fitness in adolescents [22].

General questionnaire includes questions about additional factors that might reduce or increase stress and/or health levels. For this paper we used the following factors: age; gender; location; self-reported health status.

Analysis of Distribution of Participants by Groups in Absolute Numbers and Percentages

was used as a method to determine the number of participants in each group both in absolute numbers and as a percentage of the total number of participants. This helps us to get a more complete picture of the data distribution and to understand the proportions between different groups.

Results and discussion. The study was conducted one year and 1.5 years after Russia's full-scale invasion of independent Ukraine. Unfortunately, reliable data prior to the full-scale war is unavailable. Nevertheless, we have obtained results for certain indicators, such as self-reported health symptoms, level of physical activity, level of fitness, and BMI, based on respondents' self-assessment. To compare other indicators, we compared the results of the survey taken 1 year later with those taken 1.5 years after the start of the full-scale war.

Mental health

Various researchers and practicing psychologists emphasise that experiencing and directly participating in hostilities in one's hometown can lead to long-term stress caused by war, resulting in symptoms of post-traumatic stress disorder (PTSD), depression, deterioration in quality of life and sleep. Long-term stress can have significant consequences for the psychological and physical health of the population [15].

Our study's data supports that PTSD is twice as prevalent in women than in men [8]. Notably, PTSD symptoms decreased in both genders over six months, with a rate of 26.0% one year after the start of the full-scale war, and a decrease to 16.4% one and a half years later. It could be suggested that individuals who did not directly witness explosions, killings, or other war crimes committed by Russia against civilians may have a more acute sense of military traumatic events during the first year of full-scale war than later.

The study found that women experienced significantly higher levels of stress than men. An interesting trend was, that after 1.5 years of full-scale invasion, both men and women experienced an increase in stress levels compared to the levels after one year. The data shows that the percentage of Ukrainians experiencing medium stress levels

Table 2

The state of mental health of Ukrainians 1 year and 1.5 years after Russia's full-scale invasion of independent Ukraine

	1 year						1,5 year						Δ	Total sample	
	female (n=210)		male (n=44)		total sample (n=254)		female (n=101)		male (n=39)		total sample (n=140)			n	%
	n	%	n	%	n	%	n	%	n	%	n	%			
<i>PTSD</i>															
normal (<38)	149	70.95	39	88.64	188	74.02	79	78.22	38	97.44	117	83.57	9.56	305	77.41
symptoms of PTSD (≥38)	61	29.05	5	11.36	66	25.98	22	21.78	1	2.56	23	16.43	-9.56	89	22.59
<i>Stress (PSS-4)</i>															
low (1–5)	51	24.29	22	50.00	73	28.74	16	15.84	14	35.90	30	21.43	-7.31	100	25.38
moderate (6–11)	141	67.14	22	50.00	163	64.17	73	72.28	25	64.10	98	70.00	5.83	264	67.01
high perceived (12–16)	18	8.57	0	0.00	18	7.09	12	11.88	0	0.00	12	8.57	1.48	30	7.61
<i>Depression (PHQ-9)</i>															
normal (0–4)	26	12.38	11	25.00	37	14.57	61	60.40	36	92.31	97	69.29	54.72	134	34.01
mild and moderate depression (5–14)	128	60.95	29	65.91	157	61.81	40	39.60	3	7.69	43	30.71	-31.10	200	50.76
moderately severe or severe depression (15–25)	56	26.67	4	9.09	60	23.62	0	0.00	0	0.00	0	0.00	-23.62	60	15.23
<i>Resilience (BRS)</i>															
low (1.00–2.99)	107	50.95	9	20.45	116	45.67	64	63.37	9	23.08	73	52.14	6.47	189	47.97
normal (3.00–4.30)	94	44.76	31	70.45	125	49.21	36	35.64	27	69.23	63	45.00	-4.21	188	47.72
high (4.31–5.00)	9	4.29	4	9.09	13	5.12	1	0.99	3	7.69	4	2.86	-2.26	17	4.31
<i>Insomnia (ISI)</i>															
absence or sub-threshold (0–14)	125	59.52	36	81.82	161	63.39	53	52.48	32	82.05	85	60.71	-2.67	246	62.44
moderate (15–21)	69	32.86	8	18.18	77	30.31	38	37.62	6	15.38	44	31.43	1.11	121	30.71
severe (22–28)	16	7.62	0	0.00	16	6.30	10	9.90	1	2.56	11	7.86	1.56	27	6.85

increased by 5.8%, and experiencing high stress levels increased by 1.5%. No instances of high stress levels were found among men. The increase in stress levels can be attributed to long-term exposure to stressors, unwarranted expectations of improvement in the situation, and an increase in attacks on civilian homes, causing anxiety about personal safety and the safety of loved ones.

Additionally, the restoration of medium-term planning function for most Ukrainians, which was disabled in the first few months of the full-scale war, further increased stress levels. Planning leads to increasing responsibility for the future, but it can also add stress in an unstable context.

Over a period of 6 months, respondents showed a significant decrease in the level of

depression among respondents compared to the results of the survey conducted a year after the start of the full-scale war. Specifically, no high or above-average levels of depression were detected, whereas a year after the start of the full-scale war, 26.7% of women and 9.1% of men reported such levels. Additionally, the number of people with moderate levels of depression was halved in 6 months. The increase in stress levels somewhat contradicts this fact. As previously mentioned, there were no significant differences in age and gender between the respondents in the first and second stages of the study. However, the first stage had a higher percentage of people who were in Ukraine at the time of the survey (73.6%), while the second stage had a higher proportion of respondents who were abroad, including 40.7% in European countries. The reduction in depression levels could be due to habituation and adaptation to the impact of military stress during the acceptance stage. Furthermore, the initial phase of the study was conducted during the winter and spring of 2023, when weather conditions, daylight hours, systematic power outages, and massive rocket attacks on civilians. These factors contributed to an increase in depression symptoms. The second stage of the study was carried out from August to December 2023, during a period when seasonal factors that affect the manifestation of depression symptoms were less prevalent. Despite the ongoing rocket attacks on civilians during this phase, which occurred several times a week, they have unfortunately become a common occurrence to which the majority of the population living in Ukraine has adapted.

The study also examined stress resistance, which our research indicates is gradually decreasing due to the cumulative effect of stressors.

Military operations can cause panic attacks [2]. According to data on Table 3, 8.6% of Ukrainians experienced panic attacks before the full-scale invasion. As a result of constant air attacks, bombings, occupation, violence, explosions, destruction of homes, and other war crimes, an additional 20.6% of respondents also experienced panic attacks. This highlights

the need for psychological assistance to be provided to victims. Unfortunately, only a small proportion of the population seeks psychological help, while others try to overcome symptoms of mental disorders or stressful conditions on their own. Experts estimate that up to 14 million Ukrainians will require the assistance of mental health professionals. Psychological assistance centers have been established both in Ukraine and other countries to aid those affected by the war, as well as online resources. However, Ukraine has not yet developed a culture of mental health prevention. According to a survey, 49% of Ukrainians believe that psychological help is only necessary for mentally ill people, and 80% have never sought psychological help.

Physical health

A survey was conducted among Ukrainians to gather information on the symptoms they experienced before February 2022 and at the time of the survey. Table 3 indicates that almost all symptoms exhibited a decrease in health.

Currently 37.6% of Ukrainians experience moderate or high levels of insomnia (Table 2). This percentage increased significantly after the outbreak of full-scale war [35]. The primary cause of this increase is the psycho-emotional experiences resulting from the hostilities on Ukrainian territory, as well as the frequent air attacks carried out by Russia mainly at night on civilian buildings. Ukrainian residents are forced to wake up at night due to air raid warnings and relocate to a safe place. During the two years of the full-scale war, a total of 34,293 alarms were announced, 14,925 of them at night [33]. The alarms typically lasted up to one hour, occurring almost daily in all regions of Ukraine. For instance, in Dnipro and Kharkiv regions, the maximum number of consecutive days without alarms over 2 years was 2 days, while in Poltava and Mykolaiv regions it was 3 days, and in Sumy region it was 4 days. Air raid alerts are announced at least twice a week in Ukraine, which can disrupt the sleep of Ukrainians at night or their plans during the day.

Before the outbreak of full-scale war, 17.7% of women and 14.5% of men experienced sleep problems. According to the survey, 58.8% of women and 39.8% of men reported sleep

disorders, which led to a decrease in sleep quality for 37.8% of Ukrainians (refer to Table 3).

Almost half of the surveyed Ukrainians reported experiencing joint and back pain, as well as headaches. To evaluate this indicator, we used the VAS methodology (Table 4) to assess pain in different segments of the body. One year after the start of the full-scale war, 18.5% of Ukrainians experienced severe and moderate pain, including: back pain (39.4%), headache (34.7%), pain in the legs or arms (33.5%), abdomen (20.1%), and chest (16.5%). Six months later, there was a slight change in the figures, with a 4.9% increase in cases of moderate pain in various parts of the body, including 40.7% for back pain, 30.0% for headaches, 34.3% for pain in the legs and arms, 26.4% for abdominal pain, and 20.0% for chest pain. Before the outbreak of full-scale war, 25.4% of Ukrainians experienced headaches, and 31.0% experienced back or joint pain. During the full-scale invasion period, pain levels in various body parts increased. However,

with time, the pain transitioned from acute to moderate, indicating a shift towards chronic pain and the perception of it as a personal norm. In the initial months of the invasion, stiffness and muscle pain were the most commonly reported symptoms among Ukrainians. These symptoms can be attributed to the body's somatic reaction to a strong stressor. As the stress factor has persisted for over two years, it can lead to the development of chronic diseases and may even contribute to the emergence of new ones.

During the full-scale war period, respondents reported a 14.2% increase in exacerbations of chronic diseases and an 8.63% increase in acute respiratory diseases. These findings suggest a decrease in the body's resistance to environmental influences and an overall decline in health.

Additionally, there was an increase in reported cases of high blood pressure, particularly among women, while the number of people with hypotension remained relatively stable.

Table 3

Self-reported health symptoms of Ukrainians before Russia's full-scale invasion of independent Ukraine and at the time of the survey (1–1.5 years later)

	Before February 2022						After February 2022						Δ
	female (n=311)		male (n=83)		total sample (n=394)		female (n=311)		male (n=83)		total sample (n=394)		
	n	%	n	%	n	%	n	%	n	%	n	%	
insomnia	55	17.68	12	14.46	67	17.01	183	58.84	33	39.76	216	54.82	37.81
panic attacks	29	9.32	5	6.02	34	8.63	101	32.48	14	16.87	115	29.19	20.56
back or joint pain	97	31.19	25	30.12	122	30.96	162	52.09	31	37.35	193	48.98	18.02
headache	83	26.69	17	20.48	100	25.38	151	48.55	18	21.69	169	42.89	17.51
exacerbation of chronic diseases	16	5.14	3	3.61	19	4.82	70	22.51	5	6.02	75	19.04	14.22
frequent respiratory diseases	35	11.25	3	3.61	38	9.64	67	21.54	5	6.02	72	18.27	8.63
blood pressure increasing	45	14.47	12	14.46	57	14.47	78	25.08	12	14.46	90	22.84	8.37
blood pressure decreasing	41	13.18	3	3.61	44	11.17	40	12.86	6	7.23	46	11.68	0.51
injuries, wounds, damage to muscle or bone tissue	22	7.07	10	12.05	32	8.12	12	3.86	8	9.64	20	5.08	-3.04
no health problems	57	18.33	24	28.92	81	20.56	37	11.90	20	24.10	57	14.47	-6.09

Table 4

Level of pain reported by Ukrainian respondents in different parts of the body in 1–1.5 years after Russia’s full-scale invasion of independent Ukraine

	1 year						1.5 year						Δ	Total sample (n = 394)	
	female (n = 210)		male (n = 44)		total (n = 254)		female (n = 101)		male (n = 39)		total (n = 140)			%	n
	n	%	n	%	n	%	n	%	n	%	n	%			
<i>Head</i>															
no pain or mild (0–44)	132	62.86	34	77.27	166	65.35	63	62.38	35	89.74	98	70.00	4.65	264	67.01
moderate (45–74)	56	26.67	9	20.45	65	25.59	28	27.72	4	10.26	32	22.86	-2.73	97	24.62
severe (75–100)	22	10.48	1	2.27	23	9.06	10	9.90	0	0.00	10	7.14	-1.91	33	8.38
<i>Back</i>															
no pain or mild (0–44)	120	57.14	34	77.27	154	60.63	54	53.47	29	74.36	83	59.29	-1.34	237	60.15
moderate (45–74)	60	28.57	9	20.45	69	27.17	37	36.63	9	23.08	46	32.86	5.69	114	28.93
severe (75–100)	30	14.29	1	2.27	31	12.20	10	9.90	1	2.56	11	7.86	-4.35	43	10.91
<i>Chest</i>															
no pain or mild (0–44)	173	82.38	39	88.64	212	83.46	75	74.26	37	94.87	112	80.00	-3.46	324	82.23
moderate (45–74)	33	15.71	3	6.82	36	14.17	20	19.80	2	5.13	22	15.71	1.54	58	14.72
severe (75–100)	4	1.90	2	4.55	6	2.36	6	5.94	0	0.00	6	4.29	1.92	12	3.05
<i>Arms/legs</i>															
no pain or mild (0–44)	132	62.86	37	84.09	169	66.54	62	61.39	30	76.92	92	65.71	-0.82	261	66.24
moderate (45–74)	59	28.10	4	9.09	63	24.80	29	28.71	6	15.38	35	25.00	0.20	98	24.87
severe (75–100)	19	9.05	3	6.82	22	8.66	10	9.90	3	7.69	13	9.29	0.62	35	8.88
<i>Stomach</i>															
no pain or mild (0–44)	164	78.10	39	88.64	203	79.92	69	68.32	34	87.18	103	73.57	-6.35	306	77.66
moderate (45–74)	33	15.71	3	6.82	36	14.17	21	20.79	3	7.69	24	17.14	2.97	60	15.23
severe (75–100)	13	6.19	2	4.55	15	5.91	11	10.89	2	5.13	13	9.29	3.38	28	7.11
<i>Total</i>															
no pain or mild (0–44)	167	79.52	40	90.91	207	81.50	72	71.29	37	94.87	109	77.86	-3.64	314	79.70
moderate (45–74)	38	18.10	4	9.09	42	16.54	28	27.72	2	5.13	30	21.43	4.89	74	18.78
severe (75–100)	5	2.38	0	0.00	5	1.97	1	0.99	0	0.00	1	0.71	-1.25	6	1.52

The number of injuries and damages to the musculoskeletal system decreased by 3.0%. This can be explained by the fact that respondents were able to report injuries or damages that occurred prior to the start of the full-scale war, throughout their lives (8.12%). At the time of the survey (1–1.5 years), 5.1% of Ukrainians reported new cases of musculoskeletal injuries or damages, which is a relatively high rate. The high rate of injuries may be attributed to military trauma, injuries during emergency evacuation or relocation to other regions. It is also possible that general health problems have contributed to the increase in injuries.

Only 14.5% of Ukrainians reported having no health problems, compared to 18.3% of women and 28.9% of men before the full-scale war with Russia.

Physical activity and fitness

The literature contains numerous studies investigating the impact of military stress on mental health. However, there are fewer studies on the impact of military stress on physical health, and insufficient research on the relationship between physical activity, physical fitness, and stress levels, including military stress, and

changes in attitudes towards physical activity during exposure to strong stressors.

Scientific papers present conflicting views on the benefits of physical activity in managing stress and PTSD [11; 21; 29]. However, physical activity is generally regarded as a therapeutic tool. Our study focuses on people's attitudes towards physical activity and its role in developing stress resistance in physically fit individuals.

According to the study, during the period of full-scale war, physical activity of Ukrainian population decreased by 14.5% (refer to Table 5). Both men and women reported a decrease in physical activity. Additionally, individuals who were moderately active before the start of the war were more likely to transition to an inactive or sedentary lifestyle than those who were highly active.

According to the respondents' self-assessment, the level of physical fitness decreased by 12.9%. Furthermore, while men's physical fitness remained almost the same, women reported more significant changes. By February 2022 almost 50% of women rated their level of physical fitness as high, compared to only 22.8% who rated it as low. At the time of the survey, 33.1% of

Table 5

Levels of physical activity, physical fitness and BMI reported by Ukrainians by February 2022 and at the time of the survey

	Before February 2022						After February 2022						Δ
	Female (n=311)		Male (n=83)		Total Sample (n=394)		Female (n=311)		Male (n=83)		Total Sample (n=394)		
	n	%	n	%	n	%	n	%	n	%	n	%	
<i>Level of physical activity</i>													
inactive or light active	144	46.30	27	32.53	171	43.40	193	62.06	35	42.17	228	57.87	14.47
moderate active	118	37.94	32	38.55	150	38.07	88	28.30	28	33.73	116	29.44	-8.63
high active	49	15.76	24	28.92	73	18.53	30	9.65	20	24.10	50	12.69	-5.84
<i>Level of fitness</i>													
low (1–4)	71	22.83	23	27.71	94	23.86	110	35.37	17	20.48	127	32.23	8.37
moderate (5–6)	90	28.94	17	20.48	107	27.16	98	31.51	27	32.53	125	31.73	4.57
high (7–10)	150	48.23	43	51.81	193	48.98	103	33.12	39	46.99	142	36.04	-12.94
<i>BMI</i>													
underweight (<18.49)	28	9.00	2	2.41	30	7.61	24	7.72	1	1.20	25	6.35	-1.26
normal (18.5–25)	193	62.06	47	56.63	240	60.91	188	60.45	46	55.42	234	59.39	-1.52
overweight (25.1–30)	65	20.90	24	28.92	89	22.59	67	21.54	27	32.53	94	23.86	1.27
obesity (>30)	25	8.04	10	12.05	35	8.88	32	10.29	9	10.84	41	10.41	1.53

women reported having a high level of physical fitness, while 35.4% reported having a low level. Before the outbreak of full-scale war, 51.8% of men had a high level of physical fitness, while 27.7% had a low level. At the time of the survey, the proportion of men with high and low levels of physical fitness decreased due to the transition to an average level of physical fitness.

The survey also included questions about the body weight and BMI of Ukrainian respondents. It should be noted that not all participants were able to accurately recall their weight before the February 2022, which may have affected the accuracy of the results. However, the findings indicate that there were no significant changes in body weight or BMI during the 1–1.5-year period. Of those surveyed, 22.1% reported no change in weight, 32.2% reported a decrease, and 45.7% reported an increase.

Conclusions. The study analyses the impact of Russia's full invasion of Ukraine on the health of its citizens. It shows that chronic stress symptoms have specific manifestations depending on the period since the beginning of the war and gender. Women are twice as likely as men to display signs of PTSD. After 1.5 years, these symptoms decreased by 9.6% in individuals, regardless of gender. This decrease can be attributed to the natural process of psychological adaptation to trauma. A comparable trend is in the case of depression. It is noteworthy that no high or above-average levels of depression were observed 1.5 years after the start of the full-scale war.

Simultaneously, high levels of stress were not observed in males. According to American researchers the CRHBP protein, produced by cells in stressful situations, blocks the synthesis of stress hormones, which explains the increased stress resistance of men [31].

After 1.5 years of the full-scale invasion, the level of stress perception increased by 7.3% for both men and women. This increase can be attributed to the discrepancy between expectations and reality, as well as the need for people to adapt to new challenges and constant danger to themselves and their loved ones.

The analysis of physical health symptoms over the last 1.5 years reveals an increase in sleep problems (41.1% for women and 25.3% for

men), chronic diseases (14.2%), pain in various parts of the body, and panic attacks (20.6%). These findings suggest the need for specialist intervention.

Regarding physical activity and fitness, the respondents reported a decrease of 14.5% and 12.9% for both genders, respectively.

In conclusion, military operations in Ukraine have had a negative impact on the physical and mental health of its citizens. To address this issue, preventive, therapeutic, and rehabilitation measures should be developed and implemented at the state level. It is important to note that Ukrainians living abroad may also face significant health issues and may not always have access to professional assistance.

Limitations.

The study was originally planned to commence six months after the start of the full-scale war, which would have provided more timely data. However, due to the need to obtain ethical approval, the study's commencement was postponed. Respondents were recruited online through social media and messaging platforms, making it difficult to achieve an even distribution of participants across different categories. The survey was conducted online and consisted of eight questionnaires, taking 15–20 minutes to complete. A significant number of participants did not complete all the questionnaires, resulting in fewer respondents than expected. Only those who agreed to participate were included in the survey, so it is possible that the rates of those who refused to participate differed from the total sample.

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