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Аналіз ефективності фітнес програми «Здоров'я та розвиток під час війни» на фізичне та психічне здоров'я студентів

Analysis of the Effectiveness of Fitness Programs «Health and Development during War» on the Physical and Mental Health of Students

Збереження фізичного та психічного здоров'я студентів у воєнний час – складний і неоднозначний педагогічний процес, на ефективність якого додатково впливає багато факторів. Метою статті є аналіз ефективності фітнес програми «Здоров'я та розвиток під час війни» на фізичне та психічне здоров'я студентів. Учасники експерименту: 226 студентів Хмельницької гуманітарно-педагогічної академії віком 17-19 років (147 жінок та 79 чоловіків). Методи: аналіз науково-методичних джерел; анкета; опитування; педагогічне спостереження; методика дослідження функціонального, фізичного та психологічного стану студентів; порівняльний аналіз; методи математичної статистики. Результати дослідження показали, що у студентів відбулися позитивні зміни у фізичному здоров'ї: покращилися функціональні показники розвитку дихальної системи, фізичної працездатності серцево-судинної системи, а також показники процесів відновлювання після фізичних навантажень. У розвитку фізичних здібностей студентів суттєві зміни відбулися в показниках розвитку, швидкісно-силових якостей та загальної координації рухів. Інші показники фізичного розвитку залишилися на попередньому рівні. Аналіз психічного здоров'я студентів показує, що процеси психологічної адаптації до війни у чоловіків і жінок протікають по-різному. Жінки відчувають значні коливання свого психологічного стану, тоді як психологічний стан чоловіків більш стабільний. Встановлено, що у чоловіків та жінок комунікація під час занять фізичними вправами сприяє зниженню депресії, емоційному відновленню, покращенню настрою та загальному психічному стану. Висновки. Програма «Здоров'я та розвиток під час війни» адаптована до навчання студентів в умовах воєнного стану в Україні. Позитивно впливає на розвиток функціональних і

фізичних здібностей студентів, сприяє стабілізації їх психічного стану.

Ключові слова: *фізичне здоров'я, психологічне здоров'я, навчання в умовах війни, студенти, фітнес програма.*

Maintaining students' physical and psychological health during wartime is a complex and ambiguous pedagogical process, the effectiveness of which is additionally influenced by many factors. The aim of the article is to analyze the effectiveness of the physical education and health program «Health and Development during War» on the physical and mental health of students. The participants of the experiment: 226 students aged 17–19 (147 women and 79 men) of Khmelnytskyi Humanitarian-Pedagogical Academy. Methods: analysis of scientific and methodological sources; questionnaire; survey; pedagogical observation; methodology for studying the functional, physical and psychological state of students; comparative analysis; methods of mathematical statistics. The results of the study showed that students experienced positive changes in their physical health: functional indicators of the development of the respiratory system, physical performance of the cardiovascular system, as well as indicators of recovery processes after physical exertion improved. In the development of students' physical abilities, significantly significant changes occurred in the indicators of development, speed-strength qualities and general coordination of movement. Other indicators of physical development remained at the previous level. Analysis of students' psychological health shows that the processes of psychological adaptation to war are different for men and women. Women experience significant fluctuations in their psychological state, while men's psychological state is more stable. It has been established that physical exercise and communication help reduce depression, boost emotional uplift, improve mood and overall psychological well-being. Conclusions. The «Health and Development during War» program is adapted to the education of students in the conditions of martial law in Ukraine. It has a positive effect on the development of students' functional and physical abilities, and helps stabilize their psychological state.

Keywords: *physical health, mental health, training in war conditions, students, fitness program.*

Introduction / Вступ. Preserving the health of student youth is one of the priority tasks of higher education. With the outbreak of the war in Ukraine, in order to preserve the lives and health of students, higher education institutions were forced to switch to distance and blended learning. The search for ways to preserve the physical health of young people led to the need to use the experience of conducting classes during the period of quarantine restrictions related to COVID-19 (V. Zhamardiy, et al. 2020; O. Mozolev, et al. 2021; G. Griban, et al. 2021). One of the popular technologies for preserving the health of students in Ukraine during the period of quarantine restrictions was the «Path to a healthy life» program (M. Khmara et al. 2021). The characteristic feature of this program was that it was based on the use of physical exercises of modern fitness technologies that can be used in limited space, using improvised means instead of special sports equipment. Therefore, the «Path to a Healthy Life» program was used only during air raids, when students were forced to study in bomb shelters.

Education during martial law is more mobile than during the period of quarantine restrictions. Students have the opportunity to play sports on sports grounds, in gyms and fitness clubs, while observing safety measures. This gives teachers more opportunities to influence the physical and psychological state of students. Therefore, there is a need to develop a new program to preserve the physical and mental health of Ukrainian students, taking into account the realities of wartime.

The conducted scientific researches prove that the level of motivation to engage in physical exercises among students of higher education institutions of Ukraine has significantly decreased since the beginning of the war. One of the main reasons is the daily war danger, fear for one's own life and the lives of the loved ones, desponded depressive state, reluctance to study, which is caused by the events taking place in Ukraine (V. Babadzhania, 2023; V. Yefremenko, 2024). Therefore, it is necessary to change approaches in the organization of training of students in physical education, taking into account the realities of life in modern Ukraine (Y. Lavrysh, 2022).

The changes we proposed to the program of education of students during the war years were aimed at solving such problems as: leading a sedentary lifestyle; overcoming depression, fear, and anxiety; the ability to maintain physical and mental health in extreme conditions; providing psychological assistance to victims; developing physical, functional, and moral-volitional qualities of students; the ability to act independently and interact in a team to achieve a positive result.

Our research focused on establishing the impact of physical rights on students' mental and physical health during the war. We developed a new program for physical improvement of students, which was named «Health and Development during War» and includes two content modules:

1. Content module «Step by step psychological help». We developed recommendations for providing psychological first aid to students in crisis situations during the war, which consist of four stages. Stage 1. Monitoring the psychological state of students for further determination of the structure and scope of

the necessary assistance. The questionnaire contains twenty questions. 25-30 people are examined simultaneously in 20 minutes. During the examination, the behaviour of each student is observed and, if necessary, notes are made. The obtained survey data reflect the individual and psychological characteristics of students, which significantly affect the process of their educational adaptation. Stage 2. Immunization aimed at stabilizing the psychological state of students. Students attend special adaptation courses integrated into the curriculum, where they learn alternative ways of thinking in order to alleviate negative emotional states (depression, anxiety, fear of death, etc.) and provide first aid. Stage 3. Reboot. The main means are physical exercises and active recreation. Through active physical action, psychological tension and stress are relieved. The optimal level of students' working capacity is being restored with the use of socially useful work and fitness. Stage 4. Construction of personal future. Self-regulation skills are formed: anger control, active visualization of positive images, self-training, meditation, yoga, and progressive muscle relaxation.

2. Content module «Step by step to physical perfection». It involves the establishment of communication links between students and teachers, their involvement in systematic physical exercises with a gradual increase in load, the formation of individual direction of physical development and the skills of independent physical improvement. Step 1. Monitoring the physical and functional condition of students. Step 2. Formation of mini-groups (5-7) of students according to interests and level of physical development. Step 3. Organization of classes. Students of each mini-group: study according to a separate program, which is adjusted as necessary in the process of learning; communicate with each other and provide mutual assistance to each other. During an air alert, training is carried out remotely, in the online format. The duration of the class is 80 minutes, the teacher communicates with students for at least 20 minutes in each mini-group, where he or she provides them with practical and methodological help, pays attention to the psychological state of each student, conducts individual interviews, if necessary, and makes corrections for further work. Step 4. After 3-4 months of classes, students together with the teacher develop a program of further individual physical development. Step 5. Conducting classes according to the developed program of individual physical development in online and offline form. Step 6. There is a transition to independent physical training. Step 7. Monitoring of physical and functional development of students. Step 8. Carrying out a comparative analysis with the results of monitoring at the beginning of the experiment. Step 9. Development of an individual plan for further physical self-improvement of the student.

Aim and Tasks / Мета та завдання. The aim of the article is to analyze the effectiveness of the fitness program «Health and Development during War».

The participants of the experiment: 226 students aged 17-19 (147 women and 79 men) of Khmelnytskyi Humanitarian-Pedagogical Academy.

Procedure. The conducted research included the following stages:

1. Before the start of the research. Informing the students about the content of the new program «Health and Development during War» and the features of conducting physical education classes during martial law. A survey of students about their state of health and opportunities to participate in the experimental research. Written consent was obtained from each student about the desire to participate in the experimental research.

2. Phase 1. Setting indicators of functional and physical development of students at the beginning of the research. Questionnaire of students to determine their psychological state and readiness for classes under the «Health and Development during War» program.

3. Stage 2. Examination of students to determine changes in their functional, physical and psychological state after four months of classes. The main goal is to make adjustments to the individual development program.

4. Phase 3. Establishing indicators of functional and physical development of students after completing classes under the program «Health and Development during War». Questionnaire of students to determine their psychological state.

5. Statistical analysis of changes in indicators of functional and physical development of students in the control and experimental groups. Identification of changes in the psychological state of students. Analysis of the impact of the «Health and Development during War» program on the physical and psychological health of students during the war.

Methods / Методи. To obtain the necessary information, we used the following research methods: analysis of scientific and methodological sources; questionnaire; survey; pedagogical observation; methods of studying the functional state of students; comparative analysis. Mathematical and statistical methods were used to process the experimental data obtained. The results were presented as M±m, where M is the arithmetic mean, and m is the error of the arithmetic mean.

The study of functional indicators of students' physical health included establishing changes in the performance of the following tests:

– test (a) – Stange's test (St) – assessment of the respiratory system with breath holding during inhalation;

– test (b) – Genchi's test (Gt) – assessment of the respiratory system with breath holding during exhalation;

– test (c) – body mass index (BMI) – characterizes the assessment of the correspondence of body weight to human height;

– test (d) – resting heart rate (HR) – characterizes the level of training of the cardiovascular system;

– test (e) – Ruffier-Dixon index (RDI) – characterizes the physical performance of the heart;

– test (f) – Harvard Step Test (HST) – quantitative evaluation of body recovery processes after physical exercises.

Testing the level of physical fitness of students involved the study of indicators of the development of various physical qualities in the performance of the following tests:

1) push-ups while lying down for women and pull-ups on the crossbar for men (the number of repetitions is measured) – characterizes the level of strength development;

2) long jump from a standing position (measured in centimeters) – characterizes the level of development of explosive power;

3) 100-meter run (measured in seconds) – determines the level of speed development;

4) the Burpee test (the number of repetitions is measured) – determines the development of the ability to general coordination of body movements in combination with the differentiation of speed and strength parameters;

5) shuttle run 4x9 meters (measured in seconds) – characterizes the level of dexterity development;

6) lifting the trunk to a sitting position from a lying position on the back with hands behind the head in 60 seconds (the number of repetitions is measured) – characterizes the level of development of students' speed and strength abilities;

7) Cooper's test 12-minute run for men and 6-minute run for women (the distance covered is measured in meters) – determines the level of endurance development.

The questionnaire of students to determine their psychological state during the war included answers to the following questions:

1. Assess your anxiety level.
2. How do you rate your level of depression?
3. Assess your level of emotional experience.
4. How do you assess the level of your own fear caused by the war?
5. Do air raids affect your sleep?
6. Do military actions affect your emotional state?
7. How do you rate your level of psychological exhaustion?
8. Assess your level of apathy during the war.

Students determined the indicator of their own psychological state at the following levels: no indicator; low; below normal; normal; above normal; high; extremely high.

The assessment of the psychological state was carried out according to the scale presented in Table 1.

Table 1

Assessment of indicators of psychological state of students

indicator	no	low	Below normal	normal	above normal	high	extremely high
assessment (standard unit)	-3	-2	-1	0	+1	+2	+3

The questionnaire of students to determine the importance of physical education during the war included answers to the following questions:

1. Does exercise help combat depression caused by war?
2. Does physical exertion affect your psychological state?
3. Does communication during training improve your mood?
4. Does physical exertion affect emotional recovery?
5. Does your mood improve after exercising?
6. Does physical training contribute to overcoming anxiety during wartime?
7. Does physical training allow you to overcome the fear of wartime?
8. Does physical training contribute to overcoming apathy during the war?

The value of physical education during the war was determined according to the following levels: no value; not significant; has a partial value; is of significant importance; is a vital necessity.

The assessment of the importance of physical education during the war was carried out according to the scale presented in Table 2.

Table 2

Assessment of the value of physical education during the war

indicator	no value	not significant	has a partial value	is of significant importance	is a vital necessity
assessment (standard unit)	0	1	2	3	4

The overall assessment of the indicator of the psychological state of students and the importance of physical education during the war was determined by the formula:

$\overline{X} = \frac{\Sigma X}{n}$;

Where: $\overline{X}$ – average arithmetic value;

X – values of quantities for which the average value must be calculated;

n – the total number of X values.

Results / Результати. The results of the study of changes in the functional indicators of students' physical health are presented in Table 3.

Table 3

Indicators of the functional state of physical health of students at different stages of the study (n=226)

test	Control group of girls (n=74)				Experimental group of girls (n=73)			
	Phase 1	Phase 2	Phase 3	Changes	Phase 1	Phase 2	Phase 3	Changes
	M±m	M±m	M±m	%	M±m	M±m	M±m	%
test (a)	38.5±8.5	36.5±9.0	38.2±8.7	-0.8±0.2	37.2±8.2	37.7±8.4	40.3±7.3	+8.3±1.1
test (b)	20.5 ±5.7	19.6 ±6.5	20.8±6.2	+1.46±0.5	19.8 ±4.6	20.1±5.2	22.2±5.8	+12.1±1.3
test (c)	22.96±2.82	23.21±2.94	23.18±2.96	+0.96±0.14	22.92±2.87	22.9±2.9	23.02±2.71	+0.44±0.16
test (d)	79.8±7.5	80.6±7.0	80.2±7.0	+0.5±0.5	80.3±6.0	80.5±6.5	79.6±6.5	-0.87±0.5
test (e)	9.05±1.44	9.11±1.39	9.01±1.33	-1.44±0.11	9.11±1.25	9.05±1.42	8.84±1.37	-2.98±0.23
test (f)	74.2±6.6	72.8±6.4	74.7±6.8	+0.67±0.2	73.6±6.2	74.4±6.5	77.8±7.0	+5.71±0.8
	Control group of boys (n=39)				**Experimental group of boys (n=40)**			
test (a)	41.8±8.0	41.2±8.5	42.2±8.2	+0.95±0.2	40.8±9.0	41.6±9.2	44.0±8.2	+7.84±0.8
test (b)	22.8±5.5	21.5±6.5	23.6±6.0	+3.51±0.5	23.8±7.0	24.3±7.5	26.2±6.0	+10.1±1.0
test (c)	21.62±2.67	21.78±2.74	21.72±2.58	+0.54±0.09	21.74±2.93	21.79±2.97	21.61±2.82	-0.6±0.11
test (d)	75.5±5.7	76.5±7.0	76.5±6.4	+1.32±0.7	74.5±7.0	74.5±7.5	74.0±6.5	-0.68±0.5
test (e)	8.56±1.32	8.62±1.45	8.44±1.42	-1.41±0.1	8.51±1.33	8.47±1.44	8.27±1.48	-2.82±0.25
test (f)	75.2±7.0	75.0 ±7.5	76.3±7.4	+1.46±0.4	74.0±6.6	74.8±6.8	77.2±7.2	+4.32±0.6

Where:Phase 1 – testing results at the beginning of the study;

Phase 2 – testing results four months after the start of the study;

Phase 3 – test results at the end of the study.

Analysis of the dynamics of changes in respiratory system indicators before the start of the study and after its completion shows positive changes in the parameters (St) and (Gt) that occurred in the bodies of students in the experimental group. Improvement of the indicator (St) in women was

8.3%±1.1% (p<0.01), in men it was 7.84%±0.8% (p<0.01). During the period of the research, there were positive changes in the performance of the test (Gt) were observed in the control and experimental groups. The improvement in breath holding index in women was +1.46%±0.5% (p > 0.05) in the control group and +12.1%±1.3% (p < 0.01) in the experimental group; in men, respectively, +3.51%±0.5% (p<0.05) in the control group and +10.1%±1.0% (p < 0.01) in the experimental group. Thus, performing physical exercises of the «Health and Development during War» fitness program contributed to the development of the respiratory system of students.

The analysis of the body mass index (BMI) of the participants of the research shows that it has not undergone statistically significant changes (p > 0.05) and is within the age-related development of men and women. The conducted research showed that the process of increasing body weight occurred only in individual students. A similar trend is observed when analyzing the resting heart rate (HR). In all groups of men and women under research, the indicator (HR) improved, but these changes were within the limits of statistical error (p > 0.05) and did not undergo statistically significant changes. So, it can be stated that the developed program contributes to the maintenance of (BMI) and (HR) indicators at the previous level.

Analysis of the Ruffier-Dixon index (RDI) shows that the physical performance of the heart in 87.7% of the studied women and 90.2% of men was at a good level, only 12.3% of women and 9.8% of men had a satisfactory level. The dynamics of the index (RDI) change during the study shows its gradual improvement in women in the control group by 1.44% ± 0.11% (p > 0.05), in women in the experimental group by 2.98% ± 0.23% (p < 0.05); in men, the improvement in the index (RDI) was 1.41% ± 0.1% (p > 0.05) in the control group and 2.82% ± 0.25% (p < 0.05) in the experimental group. This fact testifies to the positive impact of the «Health and Development during War» program on improving the performance of the cardiovascular system.

The analysis of the indicators of the Harvard Step Test showed that women in the experimental group had positive dynamics of recovery after physical exertion. The improvement in the (HST) index in women in the experimental group was +5.71%±0.8% (p<0.05), in women in the control group only +0.67%±0.2% (p > 0.05). In men, the changes in the index (HST) were +1.46%±0.4% (p>0.05) in the control group and +4.32%±0.6% (p<0.05) in the experimental group. So, it can be said that the «Health and Development during War» program contributes to the body's recovery processes after physical exertion.

The indicators of physical development of students at different stages of the study are presented in Table 4.

Table 4

Indicators of physical development of students at different stages of the research (n = 226)

test	**Control group of girls (n=74)**				**Experimental group of girls (n=73)**			
	Phase 1	Phase 2	Phase 3	Changes	Phase 1	Phase 2	Phase 3	Changes
	M±m	M±m	M±m	%	M±m	M±m	M±m	%
test 1	10.2±4.1	9.7±4.5	10.3±4.8	+0.98±0.7	9.7±3.5	9.9±4.2	10.4±4.4	+7.22±0.9
test 2	163.4±16.4	160.8±18.2	164.5±15.7	+0.67±0.7	160.5±16.5	158.4±17.3	162.0±17.1	+0.93±0.6
test 3	16.9±2.8	17.4±3.1	16.8 ±2.5	-0.59±0.3	17.2±2.4	17.6±2.8	17.0±2.8	-1.16±0.4
test 4	15.5±4.7	15.0±5.0	16.1±5.5	+2.54±0.8	15.2±4.2	15.5±4.5	16.5±5.5	+8.55±1.3
test 5	11.42±0.53	11.53±0.67	11.36±0.37	-0.53±0.16	11.32±0.55	11.33±0.47	11.23±0.43	-0.81±0.12
test 6	31.5±7.7	30.3±8.5	32.4±7.0	+2.86±0.7	31.3±8.6	74.4±6.5	33.2±7.5	+6.07±1.1
test 7	1.12±0.11	1.05±0.09	1.09±0.15	-1.69±0.2	1.11±0.13	1.06±0.12	1.13±0.11	+1.8±0.62
	Control group of boys (n=39)				**Experimental group of boys (n=40)**			
test 1	10.1±3.8	9.5±4.4	10.4±4.5	+2.97±0.7	9.5±4.5	9.6±5.2	10.3±5.8	+8.42±1.3
test 2	210.8±20.6	206.6±22.4	212.5±21.0	+0.81±0.4	208.6±22.6	205.5±21.0	210.6±22.0	+0.96±0.6
test 3	14.1±1.9	14.4±2.2	14.0±2.1	-0.71±0.2	14.2±2.0	14.6±2.4	14.3±1.8	+0.7±0.2
test 4	14.9±4.4	14.5±5.5	15.3±4.9	+2.68±0.5	14.4±3.6	14.6±4.2	15.4±4.4	+6.94±0.8
test 5	10.18±0.45	10.27±0.55	10.1±0.58	-0.79±0.13	10.24±0.55	10.41±0.65	10.15±0.67	-0.88±0.12
test 6	37.3±7.2	35.8±8.2	38.2±7.8	+2.41±0.4	35.8±6,7	35.4±7.5	37.8±7.8	+6.48±1.1
test 7	2.76±0.22	2.64±0.31	2.72±0.27	-1.45±0.33	2.73±0.27	2.67±0.33	2.78±0.31	+1.83±0.56

Where:Phase 1 – testing results at the beginning of the study;
Phase 2 – testing results four months after the start of the study;
Phase 3 – test results at the end of the study.

The dynamics of changes in the results of the bench press exercise for women (test 1) showed positive changes in strength development. The increase in indicators in women of the experimental group was +7.22%±0.9% ($p < 0.01$), and in the control group +0.98%±0.7% ($p > 0.05$). The dynamics of changes in the results of the pull-up exercise in men (test 1) showed that in the experimental group the improvement in results was +8.42%±1.3% ($p < 0.01$), while in the control group the improvement in results was +2.97%±0.7% ($p < 0.05$). Thus, it can be argued that the «Health and Development during War» program contributes to the development of strength of women and men.

The results of the students in performing exercise long jump from a standing position (test 2) showed that during the study period, there were no significantly significant changes in men and women of the control and experimental groups. Similar results were shown in speed exercises (test 3). Therefore, we believe that the «Health and Development during War» program allows only to maintain the level of development of explosive power and speed of women and men at the previous level.

Analysis of the dynamics of changes in performance of the Burpee test (test 4) indicates positive changes in the ability of students to improve the overall coordination of body movements in combination with the development of speed and strength parameters. The increase in the Burpee test results in the experimental group of women was +8.55%±1.3% ($p<0.01$), in the control group +2.54%±0.8% ($p<0.05$). In men, the increase in the Burpee test results in the experimental group was +6.94%±0.8% ($p<0.01$), in the control group +2.68%±0.5% ($p<0.05$). This fact testifies to the effectiveness of the «Health and Development during War» program for improving the coordination of movements combined with the development of speed and strength abilities.

The dynamics of changes in the performance indicators of the 4x9 m shuttle run exercise (test 5) showed that there were no significantly significant changes in women and men of the experimental group ($p < 0.05$). Therefore, we believe that the «Health and Development during War» program developed by us allows only to maintain the level of development of dexterity of students at the previous level.

Analysis of the dynamics of changes in the performance of the exercise lifting the trunk to a sitting position from a lying position on the back with hands behind the head in 60 seconds (test 6) showed the improvement in the performance of this exercise in all studied groups. The increase in the indicators of the development of speed-strength abilities in women in the experimental group was +6.07%±1.1% ($p<0.01$), +2.86%±0.7% ($p<0.05$) in the control group. In men, the increase in indicators was +6.48%±1.1% ($p<0.01$) in the experimental group, +2.41%±0.4% ($p<0.05$) in the control group. So, it can be said that the «Health and Development during War» program contributes to the improvement of speed and strength abilities of students.

Analysis of the results of students' endurance development (test 7) showed that no significantly significant changes were found in men and women of the control and experimental groups ($p > 0.05$). Therefore, we believe that the developed «Health and Development during War» program only allows to maintain the level of endurance development at the previous level.

The dynamics of changes in indicators of the psychological state of students at different stages of the study are presented in Fig. 1, 2.

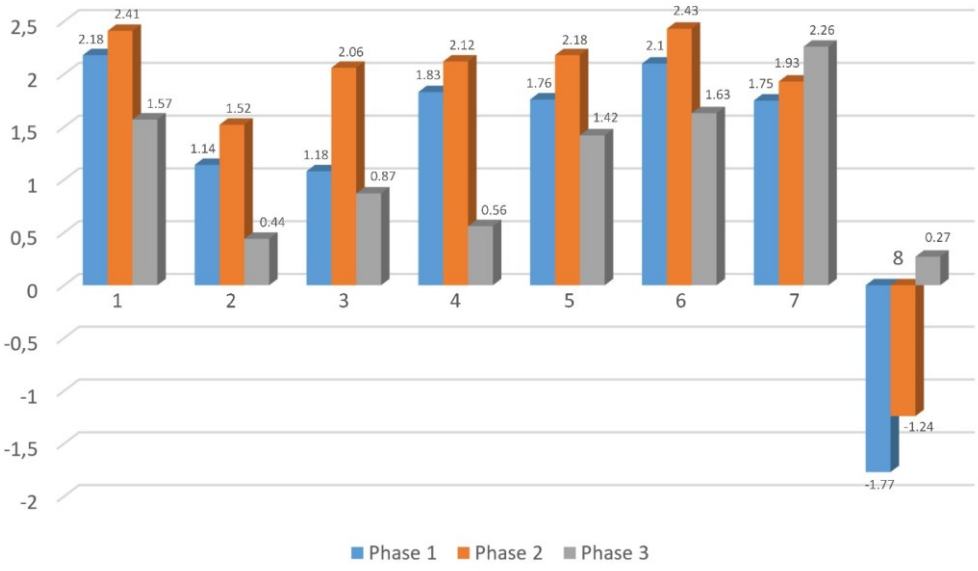

Figure 1. Dynamics of changes in indicators of the psychological state of women at different stages of the study

The analysis of changes in indicators of the psychological state of Khmelnytskyi Humanitarian-Pedagogical Academy students during the research period shows that men and women have different processes of psychological perception of war. Women have more significant fluctuations in psychological state. The peak of negative sentiment is in December 2023 - January 2024. We believe that this is caused by a complex of reasons: the depressed state of women in the winter period; frequent power outages; long air alarms; destruction of premises that are not far from the own home; lack of positive changes in the war; uncertainty in the future; increasing worries for their relatives, etc. Significant changes in the psychological state of women took place in May - June 2024. The survey showed that the level of depression, anxiety and fear caused by the war decreased by 2-3 times compared to December 2023 (Fig. 1, indicator 1-6). During the study period, women only experienced an increase in the level of psychological exhaustion (Fig. 1, indicator 7). This fact testifies to the gradual awareness and adaptation of women to the difficult realities of life under martial law and their psychological adaptation. At the same time, the large volume of negative information, the significant duration of the war and the lack of understanding of the future have a cumulative effect and lead to psychological exhaustion. An increase in the level of apathy in women (Fig. 1, indicator 8) indicates a lack of confidence in their own ability to influence external events, which ultimately also affects the level of psychological exhaustion.

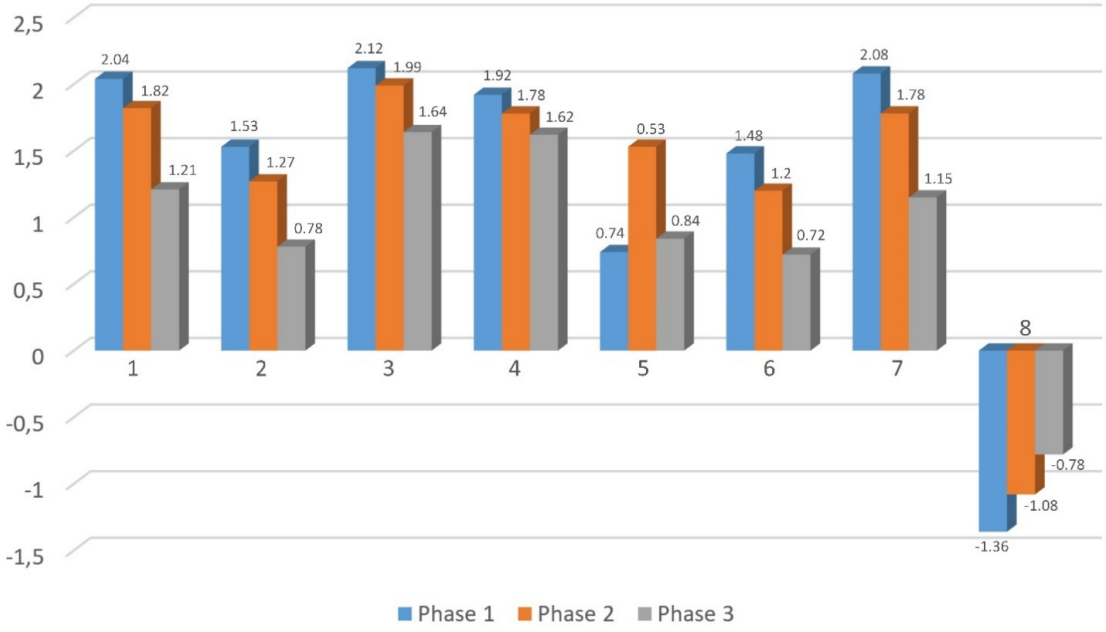

Figure 2. Dynamics of changes in indicators of the psychological state of men at different stages of the study

During the study period, men showed gradual psychological adaptation to living conditions, education, and organization of everyday life during wartime (Fig. 2, indicators 1-4, 6-8). Changes in the indicators of the psychological state of men were not as great as in women, indicating a more stable psychological state of men during the study. At the same time, a greater number of the psychological indicators studied significantly exceed the norm for peacetime. Men clearly show a general tendency toward a gradual decrease in the level of anxiety, fear, depression, experiences, and manifestations of negative emotions. The conducted study showed that the reaction of men to air alarms and anxiety during sleep did not undergo significant changes (Fig. 2, indicator 5). The studied indicators of psychological state indicate faster adaptation of men to living conditions during martial law in the country.

For our research, it was important to establish the significance of physical exercises on the psychological state of students during the period of martial law. The dynamics of changes in the attitude of students in the experimental group to the importance of physical education during the war at different stages of the study are presented in Fig. 3, 4.

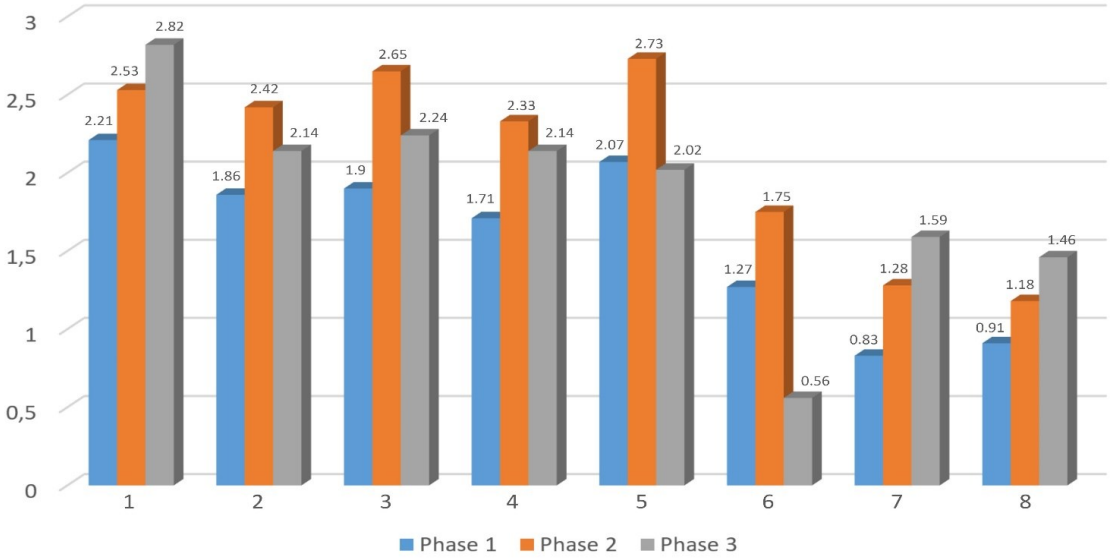

Figure 3. Dynamics of changes in the attitude of women in the experimental group towards physical education classes at different stages of the study

Analysis of the dynamics of changes in the attitude female students to physical education classes during the war shows that mood swings and changes in attitude to physical education classes are characteristic of women in different periods of the research. The survey showed that physical exercises have a greater impact on the psychological state of women during the war than on men, which is evidenced by higher indicators (Fig. 3). A characteristic feature of the dynamics of changes in the attitude of Ukrainian female students to physical education classes during the war was its maximum growth in the winter period of the experiment (Phase 2). The study showed that, according to women, it is in the winter period that communication during physical exercises contributes more to overcoming anxiety, emotional recovery, improvement of mood and general psychological state.

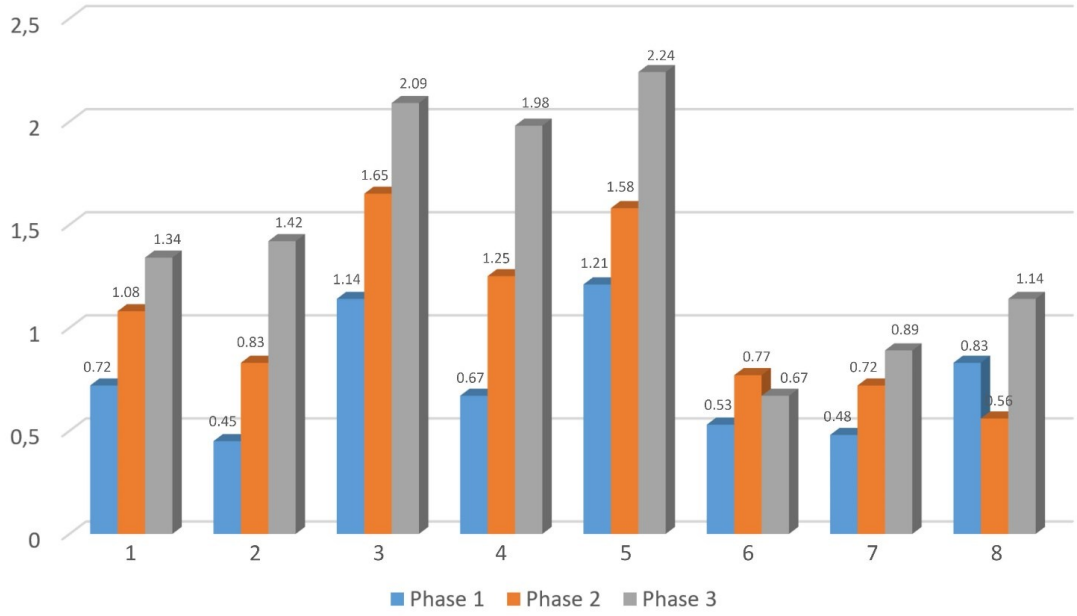

Figure 4. Dynamics of changes in the attitude of men in the experimental group towards physical education classes at different stages of the study

Analysis of changes in the attitude male students to the importance of physical education during the war shows that men are experiencing a process of gradual growth in the need for systematic physical exercises. A survey of men showed that communication during exercise helps reduce depression, emotional recovery, improve mood and general psychological state. On the other hand, systematic physical training did not significantly affect the indicators of the level of anxiety, fear and apathy during the war (Fig. 4). This shows that the shock and uncertainty of the initial stage of the war

is gradually changing to the awareness of the need to return to normal life and personal physical self-improvement. At the same time, the possibility of going to war, being injured, or being killed fills students with a high level of anxiety and fear.

Discussion / Обговорення. The analysis of scientific publications shows that the state of physical health of student youth has worsened in the last decade. Scientists see the main reasons for the existing state in the problem of leading a sedentary lifestyle of young people, which was caused by the quarantine restrictions of Covid-19, and later by the transition to distance learning in connection with the introduction of martial law in Ukraine (V. Babadzhania, 2023; O. Cherepovska, 2021). A comprehensive comparative analysis of average statistical indicators of youth health for 2014-2023 showed anthropometric, functional, and morphofunctional changes in the state of health of Ukrainian students, which indicate the appearance of excess body weight, deterioration of indicators of the cardiovascular and respiratory systems, and as a result – a decrease in the energy potential of students' work capacity. In their research, O. Andrieieva, et al. 2023, O. Mozolev, et al. 2024, O. Marchenko, 2022 et al. emphasize the fact that in recent years the problem of preserving the health of young people has acquired the status of a priority area.

With the outbreak of the war in Ukraine, the problems of preserving the physical health of young students were joined by the problems of preserving their psychological health (V. Yefremenko, et al. 2024). A. Kurapov et al. 2024 note that according to the results of the research conducted during the first eight months of the war, students experienced a significant increase in general fear of war, an increase in the level of anxiety, frequent mood swings, psychological instability, and emotional burnout. M. Kozhokar et al. 2024, V. Potop et al. 2024 indicate that psychological reactions to stressful and tragic military events can be fear, stupor, excessive anxiety, crying, aggression, guilt, apathy, etc. We cannot ignore the fact that mood swings, anger, or fear in martial law are a normal process inherent in the human psyche. V. Stadnik et al. 2022, and others draw attention to the importance of a stable psychological state of young people, which is a factor in mobilizing the body's resources and helps to overcome the difficulties of wartime. They note that during war, the human psyche is in constant tension. The problems of distance learning were added to the problems of the general unsatisfactory psychological state of students during the war (G. Leshchenko, 2022; K. Berezyak, 2022). During this period, communication between students and teachers was significantly limited, which affected the development of a feeling of loneliness and confusion in students when they did not have the opportunity to receive a qualified and reasoned answer to their questions (K. Shapar, 2024; M. Khmara, 2022). All this directly affects the motivation of young people to engage in sports and personal self-development.

The war in Ukraine caused serious short-term disruptions to the education system. The opportunities for free leisure, entertainment, sports, and attendance at educational institutions were significantly limited. V. Afanasenko 2023, Zh. Malakhova 2022, S. Latenko 2023, Y. Zabiako 2023 note that the physical education of students during martial law is not perfect due to a number of objective reasons, such as: the lack of a clear system in conducting classes (frequent transitions from on-line to off- online training); low level of motivation for independent physical exercises; insufficient level of special knowledge, practical abilities and skills in performing physical exercises; disregarding the values, needs, and interests of students during the period of martial law; low efficiency of physical education process management.

Scientists see overcoming the negative consequences of the war for the physical and psychological state of students in expanding opportunities for young people to engage in their favorite types of physical activity: dancing, fitness, sports games and other sports (M. Matvienko 2016; K. Berezyak 2022; V. Melnikov 2024). In addition, active communication, providing consultations and mutual assistance, participation in collective social events in their free time from school should become important elements of such activities. Unfortunately, today there is no universal program for conducting physical education classes that would meet all the requirements for the development of functional, physical and psychological qualities of students in wartime (O. Tserkovna 2023).

Scientists consider the problems of the effectiveness of classes on physical education of students during the period of martial law in Ukraine in terms of solving the following problems:

– development of students' responsible attitude to their own health as the highest individual and social value (S. Latenko, 2023; O. Mozolev, 2023; M. Khmara, 2025);

– conducting systematic monitoring of the physical and psychological health of students in order to respond

– development of promptly to negative phenomena and make adjustments to the education system (N. Byshevets, 2024; O. Mozolev, 2021; N. Sorokolit, 2019);students' awareness and independence in choosing forms and methods of physical and psychological self-improvement (M. Matvienko, 2016; I. Yevtifieva, et al., 2022; T. Gulko, 2023);

– motivation of young people regarding the need to preserve their own health in the difficult

conditions of martial law and the need to engage in physical exercises and sports (Zh. Malakhova, 2022; O. Marchenko, 2022; O. Mozolev, 2025);

– the need to make changes to the curriculum of the "physical education" course and introduce new topics and forms of organizing classes into the educational process that are relevant during the war (M. Khmara, 2022; O. Tserkovna, 2023; K. Shapar, 2024);

– popularization of independent classes in various types of fitness, which are the most variable and effective during distance learning of students (V. Zhamardiy, 2020; G. Griban, 2021; M. Khmara, 2021);

– adaptation of students to psychophysical and emotional stress during martial law based on ensuring a combination of changes in the cognitive, emotional and physical spheres (A. Khizhnyak 2023, A. Kurapov 2024);

– teaching students methods of independent psychological self-regulation and providing psychological assistance to other people (K. Berezyak 2022, V. Stadnyk 2022);

– making changes in the system of training specialists in the field of physical culture and sports, recreation and physical rehabilitation (T. Gulko & L. Rybalko, 2023).

The analysis of the obtained results of our research confirms the research of V. Stadnyk, 2022, M. Kozhokar, 2024 about the priority importance of physical education for preserving the physical and mental health of young people during the period of martial law. According to the results of our research, the data of O. Tserkovna 2023, Zh. Malakhova 2022, O. Marchenko 2022, V. Afanasenko 2023 regarding the improvement of existing distance learning programs for students, the development of their motivation and self-awareness in choosing forms and methods of independent physical improvement were broadened.

The conducted research confirmed and expanded the scientific views of I. Yevtifieva & S. Glyadya, 2022, M. Khmara et al. 2021, N. Byshevets, & N. Golovanova, 2024 regarding the need to systematically assess the level of physical health and functional status of students at each stage of education, which will allow making timely changes and making adjustments to educational programs in accordance with the realities of development of military actions in Ukraine and the possibility of conducting classes in offline and online format.

Conclusions / Висновки. Physical education of students in the conditions of war is a complex and ambiguous pedagogical process, the effectiveness of which is additionally influenced by many factors of organizational, managerial, psychological and material-technical support. The development of new programs for the physical development of students in the conditions of war is an important task for the successful functioning of the education system in Ukraine.

The «Health and Development during War» program is focused on conducting physical education classes in difficult wartime conditions, during air raids, and frequent changes in the online and offline form of classes. A characteristic feature of the program «Health and Development during War» is the implementation of two substantive educational modules «Step by step psychological help» and «Step by step to physical perfection». They allow solving problems of functional and physical development of students, partially stabilizing their psychological state, motivating educational activities for personal self-development. The content of the program «Path to Freedom» includes both standard and innovative physical exercises that can be performed both indoors and outdoors, individually or in a group, taking into account the educational needs of students.

The results of the research of the effectiveness of the «Health and Development during War» program showed that the students experienced positive changes in the functional indicators of the development of the respiratory system, the physical performance of the cardiovascular system, and in the improvement of indicators of recovery processes after physical exertion. In the development of students' physical abilities, reliably significant positive changes occurred in indicators of strength development, speed-power abilities, and general coordination of movements. Other indicators of physical development remained at the previous level.

Indicators of the psychological state of students indicate a different process of psychological perception of war in men and women. Women experience significant fluctuations in their psychological state, which depends on many external factors. Men have a more stable psychological state. They have traced the processes of gradual psychological adaptation to wartime conditions. It has been established that playing sports and communicating while performing physical exercises in men and women contributes to reducing depression, improving mood, emotional recovery and positive stabilization of the psychological state.

Therefore, the «Health and Development during War» program is adapted to the learning of students in the conditions of martial law in Ukraine. It has a positive impact on the development of students' functional and physical abilities, contributes to the stabilization of their psychological state and the development of motivation for their own self-improvement.

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