ORIGINAL ARTICLE

CONTENTS

Applied value of modern fitness technologies in improving the health and physical development of students

Andrii A. Rebryna[1], Yevhen V. Bazhenkov[2], Anatolii A. Rebryna[3], Halyna A. Kolomoiets[2], Tetiana K. Bondar[4], Tetiana A. Malechko[2]

[1]NATIONAL UNIVERSITY OF PHYSICAL EDUCATION AND SPORTS OF UKRAINE, KYIV, UKRAINE
[2]STATE SCIENTIFIC INSTITUTION "INSTITUTE FOR MODERNIZATION OF THE CONTENT OF EDUCATION", KYIV, UKRAINE
[3]KHMELNYTSKYI NATIONAL UNIVERSITY, KHMELNYTSKYI, UKRAINE
[4]UKRAINIAN STATE DRAGOMANOV UNIVERSITY, KYIV, UKRAINE

ABSTRACT

Aim: To study the impact of modern fitness technologies on the health and physical development of students in the learning process.

Materials and Methods: The research involved 108 students (52 male and 56 female students), which formed the experimental (EG) and the control (CG) groups. The EG male students were engaged in such type of fitness technologies as Strenflex during physical education training sessions, and the EG female students – Dance Aerobics. Students' health was assessed by Stange and Genchi tests, Rufier and strength indices; and physical development – by the level of development of physical qualities.

Results: It was found that Strenflex training sessions have a positive effect on all studied health indicators of male students (Stangea and Genchi tests, Rufie and strength indices), and Dance Aerobics training sessions are more effective in improving the functional capabilities of the respiratory and cardiovascular systems, and less effective in developing the strength capabilities of female students. It has also been established that the most pronounced effect of the applied modern fitness technologies is on the development of strength qualities in men, endurance, and flexibility in men and women.

Conclusions: The effectiveness of modern fitness technologies in physical education in educational institutions to improve students' health and physical development has been proven. The level of health and physical development of students, formed in the process of conscious training, will contribute to their successful learning and life-sustaining activities, as well as to maintaining the necessary level of motor activity in the future.

KEY WORDS: health, physical development, fitness technologies, physical education, students

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INTRODUCTION

The health of the nation is a significant indicator of the social and economic development of every developed country [1]. Unfortunately, the majority of Ukrainians today cannot boast of good health, nor can they boast of a long life. In Ukraine, the average life expectancy for men is 66 years, and for women it is 74-76 years [2]. Recently, there has been a rapid deterioration in the physical and mental health of the population of Ukraine, including student youth, due to the full-scale invasion of the russian aggressor and the introduction of martial law, the coronavirus pandemic, shortcomings in the health care system, the social and economic crisis, a sharp decline in the standard of living and quality of life against the backdrop of a poor environmental and political situation in the country, etc. [3, 4]. Among the main reasons for the deterioration of the health of modern youth, scientists also see the lack of effectiveness of the modern organization of physical education in higher educational institutions (HEIs) of Ukraine [5, 6]. Scientists point out that students are uninterested in attending traditional physical education training sessions [7, 8]. The main reasons for the low motivation of students to take physical education training sessions in HEIs are the lack of choice of the form of training sessions and dissatisfaction with the traditional content of physical education training sessions. In addition, most traditional means and methods of physical education cannot be used at home during distance learning, as well as in the future to maintain health and the required amount of motor activity during independent study [9].

Foreign experience [10, 11] shows that in many countries of the world, significant importance is given to club forms of physical education organization, which are implemented through the use of modern health-improving fitness technologies that contribute to the optimization of students' motor activity and allow for variability and, at

the same time, high efficiency of the process of physical education of student youth. According to experts [12], fitness technologies are, first of all, technologies that ensure effectiveness in fitness training sessions. More precisely, they can be defined as a set of methods, and techniques, formed into a certain algorithm of actions, which is implemented in the interests of improving the efficiency of the health process, providing a guaranteed result based on a free motivated choice of physical exercises using innovative means, methods, organizational forms, as well as modern inventory and equipment [13].

Modern fitness technologies are created in the fitness industry, which is developing rapidly and takes all the most valuable things that have been developed over many years in health-improving physical culture to solve its problems [14]. Fitness technologies have recently gained considerable popularity and occupy a strong position in the modern socio-cultural demand – the need of society for healthy and physically developed people. Their number and focus are very difficult to classify, they are constantly updated and improved. In general, scientists [13, 15, 16] identify several main groups of modern fitness technologies: cardio training (Step Aerobics, Cycle, Slide Aerobics, Bosu Training, Kangoo Jumps, Functional Training and others), strength training (Crossfit Training, Strenflex, Tabata Training, Body Sculpt, Street Workout, Barbell Workout, Bodybar Workout and others), dance training (Dance Aerobics, Zumba Fitness, Hip-hop, Street Dance, Modern Dance, Belly Dance, Pole Dance and others), training with elements of martial arts (Tai-bo, Aikido, Kickboxing, Body Combat and others), training in the water environment (Aqua Fitness, Aqua Gym, Aqua Jogging, Aqua Stretching and others), and training of psycho-regulatory orientation (Pilates, Stretching, Yoga and others). Such a variety of fitness technologies is determined by the desire to satisfy different physical culture, sports, and health interests of the general population [14]. At the same time, the rational and purposeful introduction of fitness technologies into the system of physical education in HEIs for health improvement, development, and education of student youth is today one of the main and urgent tasks of modernization of the content of education in HEIs.

AIM

The aim is to study the impact of modern fitness technologies on the health and physical development of students in the learning process.

MATERIALS AND METHODS

This research was conducted during 2021-2023 at the Department of Theory and Methods of Physical Education and Sport of Khmelnytskyi National University (Ukraine). The research involved 108 students (52 male and 56 female students), which formed the experimental (EG) and the control (CG) groups. The EG male students (n = 26) were engaged in such type of fitness technologies as Strenflex during physical education training sessions, and the EG female students (n = 28) – Dance Aerobics. The training sessions were conducted by professional fitness trainers who are members of the Department of Theory and Methods of Physical Education and Sport. The CG students (men (n = 26) and women (n = 28)) were engaged in traditional methods of physical education under the guidance of the department's teachers. Students were divided into groups at the beginning of the academic year by free conscious choice of students after the introductory briefing. The students were informed about the availability of specialists at the HEI and the conditions for training in modern health and fitness technologies. The number of hours spent on physical education for the EG and the CG students during the study was the same. The duration of the experiment was 2 years, during the 1st and 2nd year of study.

Strenflex (strength aerobics) is a system of multi-vector exercises based on the implementation of three main areas of fitness: strength, endurance, and flexibility. That is, training with this type of fitness technology is aimed at developing strength, aerobic capacity, and flexibility. The goal of Strenflex is to train the whole body, reflecting a modern lifestyle focused on ensuring a good appearance, and healthy lifestyle, slowing down the aging process, and maintaining creative, physical, and mental performance. Strenflex training involves various types of training sessions: ABS (abdominal, back, spine) – strength combined movements aimed at working out the muscles of the back and abs; ABT (abdominal, bums, thighs) – strength combined movements aimed at working out the muscles of the back and legs; TABS (total abdominals) – strength combined movements aimed at working out the muscles of the back, abs, and muscle corset; Upper Body – strength combined movements aimed at working out the muscles of the arms, shoulders, chest, upper back and abdominal muscles; Low Body – strength combined movements aimed at working out the muscles of the legs, back, and abs; Body Sculpt – strength combined movements aimed at working out the muscles of the whole body; and other combined movements with and without equipment [17].

Dance Aerobics training sessions are based on a harmonious combination of dosed exercises for general development, running, jumping, and dance elements, organized by emotional rhythmic music, and performed

without pauses for rest (in a streaming manner). Dance aerobics is based on various dance styles. Each type of dance aerobics is characterized by movements and music corresponding to a particular style of dance. The training was conducted in a medium or high-intensity mode [18].

Research methods: analysis and generalization of literary sources, medical and biological methods, testing, statistical analysis. The method of analysis and generalization of literary sources contributed to the study of the literature on the topic of the research (25 sources from the databases PubMed, Scopus, Web of Sciences, Index Copernicus and others were investigated). Medical and biological methods were used to study health indicators of students. We determined the following indicators: timed inspiratory (Stange test) and expiratory (Genchi test) capacity – to assess the respiratory system; the Rufier index – to assess the cardiovascular system; and the Strength index – to assess the development of the students' muscular system. Testing was used to assess the physical development of students based on the results of the following tests: 100 m run (speed qualities), pull-ups (for male students) and push-ups (for female students) (strength qualities), 1 km run (endurance), and leaning torso forward (flexibility).

Statistical analysis was applied to correctly process the data and identify the difference between the indicators under study. The compliance of the data distribution with the Gauss' law was assessed using the Shapiro-Wilk W-test. The significance of the difference in the results of the students was determined during the studying based on the Student's t-test. The significance for all statistical tests was set at $p < .05$. All statistical analyses were performed with the SPSS software, version 10.0. This research followed the regulations of the World Medical Association Declaration of Helsinki and ethical principles for medical research involving human subjects and was approved by the Academic Council of Khmelnytskyi National University (Protocol No. 2 dated 03.09.2021). Informed consent was received from all students who took part in this research.

RESULTS

Assessment of students' health indicators at the beginning of the research shows that for all studied indicators there was no significant difference between the EG and the CG, both in men and women ($p > 0.05$). Instead, at the end of the research, a significant advantage was found in the respiratory and cardiovascular system functional capabilities indicators in the EG students, both men and women (Table 1). Thus, in the tests with breath-holding in the EG students at the end of the research significantly better indicators were recorded compared to the CG, by 6.5 s in the Stange test ($p < 0.05$) and by 4.6 s in the Genchi test ($p < 0.01$). The EG women also showed significantly better respiratory holding capacity than the CG ones, by 9.4 s in the Stange test ($p < 0.01$) and by 3.25 s in the Genchi test ($p < 0.05$). The level of functional state of the respiratory system in the EG students (males, females) at the end of the research was assessed as "excellent", and in the CG – as "good". The Rufier index of male and female students of the EG at the end of the research was also significantly better than in the CG, by 0.33 c. u. and 0.43 c. u., respectively. At the same time, the functional state of the cardiovascular system of the EG and the CG students corresponded to a sufficient level. According to the results of the research on the strength index, a significant difference between the EG and the CG indicators was found only in men – it was 4.11 % ($p < 0.01$). It was also found that during the 1st and 2nd years of study at the HEI, all indicators of the EG, unlike the CG, significantly improved ($p < 0.05$; $p < 0.001$). The analysis shows that Strenflex training sessions have a positive effect on all studied health indicators of male students, and Dance Aerobics training sessions are more effective in improving the functional capabilities of the respiratory and cardiovascular systems, and less effective in developing the strength capabilities of female students.

Analyzing the physical development of students, we found that there was no significant difference between all indicators of the EG and the CG ($p > 0.05$) at the beginning of the research. At the end of the research, certain dependencies were revealed: fitness technologies have the most pronounced effect on the development of strength qualities in men, endurance, and flexibility in men and women, but are not effective enough in the development of speed qualities. Thus, at the end of the research, there was no significant difference between the results of the 100 m run in the EG and the CG neither in male nor in female students ($p > 0.05$) (Table 2).

Significantly better results in pull-ups in male students of the EG compared to the CG were found at the end of the research: the difference was 2.8 times ($p < 0.001$). No significant difference was revealed in push-ups ($p > 0.05$) in the EG and the CG women. According to the results of the 1 km run and torso tilting forward, the positive influence of both types of fitness technologies on the development of endurance and flexibility of the EG students was established. At the end of the research, the difference in the results of the 1 km run was 15.5 s in men and 14.9 s in women ($p < 0.001$); in torso tilting – 4.5 cm in men and 4 cm

Table 1. Dynamics of health indicators of the EG and the CG students during their 1st and 2nd instructional years (X±m, n=108)

Health indicators	Gender	Research stages	EG	CG	t	p
Stange test, s	M	Beginning	55.7±1.95	56.2±2.03	0.18	>0.05
		End	66.1±1.84**	59.6±1.97	2.41	<0.05
	F	Beginning	51.6±1.89	50.9±1.92	0.26	>0.05
		End	63.5±1.81***	54.1±1.85	3.63	<0.01
Genchi test, s	M	Beginning	35.6±0.88	34.8±0.92	0.63	>0.05
		End	43.1±0.82***	38.5±0.87*	3.85	<0.01
	F	Beginning	32.9±0.95	33.2±1.04	0.21	>0.05
		End	40.7±0.89***	37.2±0.96**	3.85	<0.05
Rufier index, c. u.	M	Beginning	7.39±0.09	7.21±0.10	1.34	>0.05
		End	5.86±0.08***	6.19±0.09***	2.74	<0.05
	F	Beginning	7.11±0.10	7.15±0.10	0.28	>0.05
		End	6.05±0.09***	6.48±0.10***	3.20	<0.01
Strength index, %	M	Beginning	58.41±0.99	57.95±0.96	0.33	>0.05
		End	64.18±0.91***	60.07±0.93	3.16	<0.01
	F	Beginning	39.60±0.85	38.81±0.90	0.64	>0.05
		End	41.33±0.79	40.24±0.91	0.90	>0.05

Note: M – male students; F – female students; X – arithmetic mean; m – error of arithmetic mean; t – Student's test value; p – reliability value; * – p<0.05; ** – p<0.01; *** – p<0.001.

Table 2. Dynamics of physical development indicators of the EG and the CG students during their 1st and 2nd instructional years (X±m, n=108)

Physical development indicators	Gender	Research stages	EG	CG	t	p
100 m run, s	M	Beginning	14.5±0.12	14.4±0.13	0.57	>0.05
		End	14.1±0.11*	14.2±0.12	0.61	>0.05
	F	Beginning	16.8±0.11	16.9±0.12	0.61	>0.05
		End	16.6±0.10	16.7±0.11	0.67	>0.05
Pull-ups, times	M	Beginning	9.8±0.47	9.5±0.43	0.47	>0.05
		End	15.1±0.41***	12.3±0.46*	4.54	<0.001
Push-ups, times	F	Beginning	12.2±0.54	11.9±0.49	0.41	>0.05
		End	15.4±0.58**	13.9±0.55*	1.88	>0.05
1 km run, s	M	Beginning	265.2±2.16	259.8±2.23	1.74	>0.05
		End	231.7±1.97***	247.2±2.09**	5.40	<0.001
	F	Beginning	306.5±2.29	309.9±2.41	1.02	>0.05
		End	276.8±2.06***	291.7±2.30**	4.83	<0.001
Leaning torso forward, cm	M	Beginning	7.9±1.11	8.1±1.16	0.12	>0.05
		End	13.5±1.15**	9.0±1.14	2.78	<0.05
	F	Beginning	11.6±0.97	12.1±1.02	0.36	>0.05
		End	17.5±1.06***	13.5±1.05	2.68	<0.05

Note: M – male students; F – female students; X – arithmetic mean; m – error of arithmetic mean; t – Student's test value; p – reliability value; * – p<0.05; ** – p<0.01; *** – p<0.001.

in women ($p < 0.05$). The conducted research proved a more vivid positive effect of consciously chosen training sessions with modern fitness technologies, compared to the traditional method of physical education in HEIs, on strengthening health and improving the physical development of student youth.

DISCUSSION

According to scientists [19], today the higher education system of Ukraine is at the stage of fundamental changes, characterized by a new understanding of the goals and objectives of education and the need to modernize many academic subject areas, including physical

education, with new modern methods and techniques of effective educational and health improvement activities of students using fitness technologies, to create quality higher education and form a healthy young generation. According to scientists [20], in recent years in Ukraine, attention to the popularization of a healthy lifestyle among the population, including students, has increased significantly. This is evidenced by the state leadership's awareness of the problems of preventing non-communicable diseases, which puts the preservation of public health on par with the preservation of the country's sovereignty, welfare, and other national interests of the state.

Indeed, according to many scientists [21], improving the health status of modern high schoolers and students is the main task in pedagogical science, because health is the second in the hierarchy of needs, inferior to human life. Health is considered by some scientists as a state of well-being and well-doing of the body, as the ability to counteract the negative impact of the environment, and as the highest vital value of a person and society [22]. According to other authors [23], health is the degree of ability of an individual or group, on the one hand, to realize their aspirations and meet their needs, and on the other hand, to change the environment or cooperate with it. Scientists interpret the process of forming and strengthening the health of young people while studying in educational institutions as the creation of an optimal psychosomatic constitution within the framework of a possible genotype and the prevention of possible diseases. The main principles and means of forming the health of student youth embrace ensuring optimal living conditions (study, everyday life), which include the absence of stress, rational nutrition, adequate sleep; absence of bad habits; optimal motor activity, and systematic physical activity [24]. It is difficult to overestimate the role of physical exercises on the health of students, however, today, in the process of physical education of students at HEIs, it is necessary to use such means that students would be engaged consciously, motivated, and with interest [25]. That is why most experts advise introducing modern fitness technologies into the system of physical education to massively and consciously involve students in active recreational exercise while studying at a HEI, taking into account the capabilities of the educational and sports base of the HEI and the availability of specialists in a particular type of fitness technology [26].

A wide range of modern fitness technologies will not only update the content of physical education at HEIs, motivate students to exercise, and lead a healthy lifestyle, but also relieve additional financial burden on educational institutions, as most technologies do not require inventory and equipment. By actively using a variety of physical exercises from modern fitness technologies, students improve their health, physical development, and fitness [14, 15, 18]. The results obtained in our research confirm the conclusions of many scientists and prove the effectiveness of the use of modern fitness technologies in the physical education at HEIs to improve the health and physical development of students.

CONCLUSIONS

The conducted research proved a more vivid positive effect of consciously chosen training sessions with modern fitness technologies, compared to the traditional method of physical education at HEIs, on improving the health and physical development of students. It was found that Strenflex training sessions have a positive effect on all studied health indicators of male students (Stangea and Genchi tests, Rufie and strength indices), and Dance Aerobics training sessions are more effective in improving the functional capabilities of the respiratory and cardiovascular systems, and less effective in developing the strength capabilities of female students. It has also been established that the most pronounced effect of the applied modern fitness technologies is on the development of strength qualities in men, endurance, and flexibility in men and women, but is not effective enough in the development of speed qualities.

The effectiveness of modern fitness technologies in physical education in educational institutions to improve students' health and physical development has been proven. The level of health and physical development of students, formed in the process of conscious training, will contribute to their successful learning and life-sustaining activities, as well as to maintaining the necessary level of motor activity in the future.

PROSPECTS FOR FURTHER RESEARCH

It is planned to investigate the effectiveness of other types of modern fitness technologies in improving students' health.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest

CORRESPONDING AUTHOR
Tetiana A. Malechko
Institute for Modernization of the Content of Education
36 Metropolitan Vasyl Lipkovsky st, 03035 Kyiv, Ukraine
e-mail: tanya.bubley@ukr.net

ORCID AND CONTRIBUTIONSHIP
Andrii A. Rebryna: 0000-0002-5108-2793 A
Yevhen V. Bazhenkov: 0000-0003-0117-294X D
Anatolii A. Rebryna: 0000-0001-7707-5324 B
Halyna A. Kolomoiets: 0000-0002-4315-3977 B C
Tetiana K. Bondar: 0000-0001-5953-6713 E
Tetiana A. Malechko: 0000-0001-9430-6745 D F

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

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