ФІЗИЧНЕ ВИХОВАННЯ РІЗНИХ ГРУП НАСЕЛЕННЯ

https://doi.org/10.15802/2071-1476-2026-1-07

УДК 796-053.6(045)

EFFECTIVENESS OF THE TECHNOLOGY OF FORMING PERSONAL PHYSICAL CULTURE OF OLDER ADOLESCENTS

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Внесок авторів: A – дизайн дослідження; B – збір даних; C – статистичний аналіз; D – підготовка рукопису; E – збір коштів.
Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Annotation

Introduction. Forming a person's physical culture has become a priority area in the field of physical culture and sport. In 2020, Ukraine adopted a new State Standard of Basic Secondary Education, which emphasizes the importance of fostering the mental and socio-psychological development of pupils through physical education, raising awareness of the importance of physical activity for improving health, and expanding motor experience by motivating people to engage in physical culture and sports. Consistent with contemporary requirements of domestic pedagogical education, there are contradictions between the recognition of the necessity to develop physical culture in accordance with the modern concept of education and its implementation in the practical activities of educational institutions. Therefore, the problem of theoretical justification and innovative approaches and their implementation in the formation of personal physical culture of middle school children becomes relevant. **The purpose of the study** is to determine the effectiveness of the technology of forming personal physical culture of older adolescents. **The material and methods of the study.** Methods of the study: analysis and generalisation of scientific and methodological literature and materials from the Internet; sociological methods (questionnaire survey of pupils using the questionnaire «My physical activity», method developed by E.V.Bochenkova «Self-description of physical development»; pedagogical methods (observation and experiment); psychological and diagnostic methods (modified methodology of M.Rokeach, methodology of Yu.M.Orlov); testing of theoretical knowledge; functional research methods (Ruffier test, Stange test, Genchi test, dynamometry); methods of assessing physical fitness («Flamingo» balance test, «Lifting the torso from a lying position in 1 minute» test, «Bending the torso from a sitting position» test); methods of mathematical statistics. **Results.** The study of the effectiveness of our proposed technology for forming personal physical culture of adolescents showed that changes in value orientations occurred during the experiment. Determining the need for success using the method developed by Orlova Yu.M. showed that at the end of the pedagogical experiment, there was an increase in the degree of expression of the need for success (in 7th grade from 14.27 to 17.26 points; in 8th grade from 13.56 to 17.07 points; in 9th grade from 13.41 to 16.91 points). During the pedagogical experiment, a reliable ($p<0,05$) increase in theoretical knowledge was recorded. Changes in the physical activity of adolescents were identified, and the number of children with low levels of physical activity decreased. The level of functional indicators in adolescents has increased. Analysis of changes in physical fitness indicators showed a significant increase (p0,05) in all tests. **Conclusions.** The results of the formative pedagogical

experiment proved the effectiveness of innovative technology for developing personal physical culture in improving the health of adolescents aged 14–15, as there was a statistically significant improvement in indicators of physical development, physical and theoretical preparedness, and motor activity of schoolchildren, which provides grounds for the practical implementation of the author's technology in the physical education system of older schoolchildren.

Keywords: technology, personal physical culture, adolescence, physical education, values of physical culture.

ЕФЕКТИВНІСТЬ ТЕХНОЛОГІЇ ФОРМУВАННЯ ОСОБИСТОЇ ФІЗИЧНОЇ КУЛЬТУРИ СТАРШИХ ПІДЛІТКІВ

Анотація

Вступ. Формування фізичної культури особистості стало пріоритетним напрямком галузі фізичної культури і спорту. В Україні у 2020 році був прийнятий новий Державний стандарт базової середньої освіти, в якому зазначається необхідність формування психічної та соціально-психологічної сфер особистості засобами фізичного виховання, усвідомлення значення рухової активності для покращення стану здоров'я, розширення рухового досвіду через формування мотивації до занять фізичною культурою і спортом. У відповідності до сучасних вимог вітчизняної педагогічної освіти наявні суперечності між усвідомленням необхідності формування фізичної культури особистості у відповідності до сучасної концепції освіти та її реалізацією у практичній діяльності закладів освіти. Тому актуалізується проблема теоретичного обґрунтування і інноваційних підходів та їх реалізації щодо формування особистої фізичної культури дітей середнього шкільного віку. **Мета дослідження –** визначити ефективність технології формування особистої фізичної культури старших підлітків. **Матеріал і методи дослідження.** Методи дослідження: аналіз та узагальнення науково-методичної літератури та матеріалів мережі «Інтернет»; соціологічні методи (анкетування учнів за анкетою «Моя рухова активність», методика Є.В. Боченкової «Самоопис фізичного розвитку»; педагогічні методи (спостереження та експеримент); психолого-діагностичні методи (модифікована методика М. Рокича, методика Ю.М. Орлова); тестування теоретичних знань; функціональні методи дослідження (проби Руф'є, Штанге, Генча, динамометрія); методи оцінки фізичної підготовленості (тести «Фламінго», «Піднімання тулуба з положення лежачи за 1 хв.», «Нахил тулуба з положення сидячи»); методи математичної статистики. **Результати.** Дослідження ефективності запропонованої нами технології формування особистої фізичної культури підлітків показало, що протягом експерименту відбулись зміни ціннісних орієнтацій. Визначення потреби у досягненні успіху за методикою Орлової Ю.М. показало, що наприкінці педагогічного експерименту виявлено підвищення ступеня виразності потреб у досягненні успіху (у 7 класі з 14,27 до 17,26 балів; у 8 класі з 13,56 до 17,07 балів; у 9 класі з 13,41 до 16,91 балів). У ході педагогічного експерименту зафіксовано достовірне ($p<0,05$) підвищення теоретичних знань. Виявлено зміни у руховій активності підлітків, знизилась кількість дітей, які мали низький рівень рухової активності. Підвищився рівень функціональних показників підлітків. Аналіз змін показників фізичної підготовленості показав достовірний приріст ($p<0,05$) за всіма тестами. **Висновки.** Результати проведеного формувального педагогічного експерименту довели ефективність впливу інноваційної технології формування особистої фізичної культури на зміцнення здоров'я підлітків 14-15 років, оскільки відбулось статистично достовірне покращення показників фізичного розвитку, фізичної та теоретичної підготовленості, рухової активності школярів, що дає підставу для практичного впровадження авторської технології у систему фізичного виховання учнів старшого шкільного віку.

Ключові слова: технологія, особиста фізична культура, підлітки, фізичне виховання, цінності фізичної культури.

Introduction. Forming a person's physical culture has become a priority area in the field of physical culture and sport. In 2020, Ukraine adopted a new State Standard of Basic Secondary Education, which emphasizes the importance of fostering the mental and socio-psychological development of pupils through physical education, raising awareness of the importance of physical activity for improving health, and expanding motor experience by motivating people to engage in physical culture and sports [1, 2].

The issue of developing personal physical culture in school-age children has been presented in a significant number of scientific works. Significant scientific and theoretical experience has been accumulated regarding the structure and functions of a person's physical culture, the educational component of schoolchildren's physical culture, the principles of formation and content of a person's physical culture have been substantiated [3, 4]; the theoretical and methodological foundations of non-specialised physical education have been thoroughly examined [5-7]; the formation of value orientations in physical culture and sport [8-12].

Favourable conditions for the development of personal physical culture are created during adolescence. As a result of the restructuring of the organism based on self-aware-

ness, adolescents build relationships with adults and peers. It is precisely during this period that the child discovers their inner world and their sense of self; their worldview is formed, their system of values becomes organized, and they develop an awareness of their own individuality. Forming personal physical culture in adolescence is an important task [13-15].

Consistent with contemporary requirements of domestic pedagogical education, there are contradictions between the recognition of the necessity to develop physical culture in accordance with the modern concept of education and its implementation in the practical activities of educational institutions. Therefore, the problem of theoretical justification and innovative approaches and their implementation in the formation of personal physical culture of middle school children becomes relevant.

The research was conducted in accordance with the thematic plan of the scientific research work of the Department of Theory and Methods of Physical Education and Sports of Hryhorii Skovoroda University in Pereiaslav for 2020–2024 under the topic «Integration of the physical, intellectual, and spiritual development of children, adolescents, and youth of Ukraine in the process of physical education, health-enhancing, and sports activities» (State Registration № 0118U003847).

Hypothesis – it was assumed that the technology of forming personal physical culture in adolescents would contribute to increasing the level of knowledge, awareness of the importance and values of physical culture and sport, and improving physical condition.

The purpose of the study is to determine the effectiveness of the technology of forming personal physical culture of older adolescents.

The material and methods of the study

Participants. The study involved 35 7th grade pupils, 31 8th grade pupils, and 34 9th grade pupils from Lyceum № 23 of the Kamyanske City Council (Kamyanske, Dnipropetrovsk region). Informed consent to participate in this study was obtained from all participants.

Procedure. Methods of the study: analysis and generalisation of scientific and methodological literature and materials from the Internet; sociological methods (questionnaire survey of pupils using the questionnaire «My physical activity», method developed by E.V.Bochenkova «Self-description of physical development»; pedagogical methods (observation and experiment); psychological and diagnostic methods (modified methodology of M.Rokeach, methodology of Yu.M.Orlov); testing of theoretical knowledge; functional research methods (Ruffier test, Stange test, Genchi test, dynamometry); methods of assessing physical fitness («Flamingo» balance test, «Lifting the torso from a lying position in 1 minute» test, «Bending the torso from a sitting position» test); methods of mathematical statistics.

A questionnaire entitled «My Physical Activity» was conducted among schoolchildren to determine the level of physical activity among adolescents aged 14–15.

To determine the degree of adequacy of adolescents' self-assessment of their appearance, strength, sports achievements, coordination abilities, and health, Ye.V. Bochenkova's questionnaire «Self-Description of Physical Development» was used. It consisted of 70 questions distributed across the following scales: health, coordination of movements, physical activity, body slenderness, athletic abilities, global physical self, appearance, strength, flexibility, endurance, and self-esteem.

To study the specific features of the formation of schoolchildren's value orientations, we used M. Rokeach's methodology, which takes into account the age-related characteristics of pupils that determine the functioning of the mechanism of value differentiation and the nature of selecting particular values.

Yu.M.Orlov's methodology «Need for Goal Achievement. Scale for Assessing the Need for Success Achievement» was used to determine the need for goal attainment, success, and achievements in general. The results of applying this method confirm that the higher adolescents' self-esteem, the more active they are and the more focused they are on achieving results.

To assess the level of theoretical knowledge of pupils in 7th-9th grades, a questionnaire was conducted using Google Forms software, which contained 43 test questions with four answer options corresponding to the physical education curriculum.

The Ruffier functional test was used to determine changes in heart rate recorded at different stages of recovery after a standard physical load, specifically performing 30 squats in 45 seconds. Heart rate was measured after 5 minutes of rest in the supine position for 15 seconds before the load, as well as during the first and last 15 seconds of the first minute of recovery.

The Ruffier Index (RI) was calculated using the formula:

$$RI=(4\times(HR_1+HR_2+HR_3)-200)/10,$$

where HR_1 is the resting heart rate measured for 15 seconds before the squats; HR_2 is the heart rate during the first 15 seconds of the first minute of recovery; and HR_3 is the heart rate during the last 15 seconds of the first minute of recovery.

The Stange test determines the duration of breath-holding after inhalation, while the Genchi test measures the duration of breath-holding after exhalation. The combined use of these tests makes it possible to assess the condition of the respiratory system and the resistance of brain cells to hypoxia, which is one of the most important abilities of the body during adaptation to physical exertion. A significant positive dynamic of these changes may indicate beneficial functional adjustments and the structural interrelationship between the nervous and respiratory systems in adolescents.

We used dynamometry to determine the muscle strength of the hand. For this purpose, we used a hand dynamometer. The test was repeated three times for each hand separately. The highest dynamometer indication was recorded.

Physical fitness levels were assessed using the «Flamingo» balance test, «Lifting the torso from a lying position in 1 minute» test, «Bending the torso from a sitting position» test.

The research procedure complied with the 2008 Declaration of Helsinki.

Statistical analysis. The processing of empirical data was carried out to interpret the results of the pedagogical experiments. The following mathematical procedures were applied: evaluation and characterization of variation series parameters for representatives of different age and sex groups, namely the arithmetic mean of the variation series ($\bar{x}$) and the standard deviation (S); the standard error of the mean (m) and the coefficient of variation (V). Comparisons were made and the significance of differences between individual groups was determined using Pupil's t-test at a significance level of not less than 0.05.

To determine the arithmetic mean value of respondents' answers to the questionnaire items, the method of calculating relative proportion indicators was applied using the following formula:

$$P\% = m / n \times 100\%,$$

where P% is the relative proportion indicator; m is the number of respondents who selected a particular answer option; n is the sample size.

To determine the significance of differences between respondents' opinions and the average statistical indicator, the chi-square (χ^2) test was applied. This criterion was used to test the hypothesis of the uniformity of the observed frequency distribution in the respondents' answers. When the probability value (p-value) exceeded 0.05, its exact value was reported; in other cases, it was indicated as p-value < 0.05 or p-value < 0.001.

When assessing statistical significance, Pearson's chi-square (χ^2) goodness-of-fit test (for one sample) and Pearson's chi-square test of independence (for two independent samples) were applied. The degrees of freedom (df) were calculated as the product of the number of categories in the contingency table minus one for each dimension. The level of statistical significance was set at $\alpha = 0.05$ ($p < 0.05$).

Internal consistency of the questionnaire developed by us was assessed using Cronbach's alpha coefficient. To objectify the evaluation of the questionnaire's internal consistency, the items were conditionally grouped into specific blocks, for each of which Cronbach's alpha was calculated. Statistical analyses were performed using a personal computer, specifically with the software Excel 2021 running on the Windows operating system.

Results. The analysis of scientific studies and the results of the ascertaining experiment made it possible to scientifically substantiate the technology for developing the personal physical culture of adolescents aged 14–15.

The technology for developing personal physical culture included: prerequisites, goals, objectives, principles, areas of influence, organisational and pedagogical conditions for implementing the technology, criteria and stages of implementation.

The purpose of the technology is to shape schoolchildren's conscious attitude towards physical education and sports in order to build an individual trajectory of personal physical culture.

The technology for developing personal physical culture in older adolescents is based on a competency-based approach [16]. The development of key competencies in the process of implementing personal physical culture technology was accomplished in all forms of physical education classes.

The dynamics of the value–motivational sphere of adolescents during the experiment were assessed using M. Rokeach's Value Orientations methodology. At the beginning of the study, the top three terminal values among 7th-grade pupils were as follows: first place – self-development (4.28 ± 0.75 points); second – an active and productive life (4.25 ± 0.89 points) and the presence of good and loyal friends (4.25 ± 1.02 points); third – financial security (4.13 ± 0.81 points).

At the end of the experiment, the top three terminal values among 7th-grade pupils changed: first place – an active and productive life (4.27 ± 0.86 points); second – health (4.60 ± 0.60 points); third – self-confidence (4.59 ± 0.51 points).

A notable increase in the maximum mean value of the ranking of terminal values (from 4.36 ± 0.77 to 4.63 ± 0.55 points), along with a statistically significant decrease in the minimum mean value (from 3.54 ± 0.98 to 2.57 ± 0.92 points) ($p < 0.05$), was observed.

The analysis of the top three terminal values among 8th-grade pupils at the beginning of the study revealed the following priorities: first place – an interesting job (4.27 ± 0.51 points); second – knowledge and learning (4.24 ± 1.11 points); third – financial security (4.17 ± 1.58 points).

It should be noted that among 8th-grade pupils, there was a statistically non-significant increase in the mean maximum score for the first rank in the rating (from 4.27 ± 0.51 to 4.41 ± 0.96 points; $p > 0.05$), as well as a statistically significant increase in the minimum score assigned by respondents to particular values during the study (from 3.13 ± 0.47 to 3.59 ± 1.16 points; $p < 0.05$). Thus, during the experiment, due to the competencies acquired, changes also occurred in the substantive orientation of the 8th-grade pupils' personalities.

Among 8th-grade pupils, the following ranking of terminal values was identified after the experiment: first place – an active and productive life (4.41 ± 0.96 points); second – health (4.35 ± 0.85 points); third –

self-confidence (4.32 ± 0.81 points).

The analysis of the top three terminal values among 9th-grade pupils at the beginning of the study revealed the following priorities: first place – freedom (4.73 ± 0.30 points); second – entertainment (4.69 ± 0.46 points); third – self-development (4.68 ± 0.61 points).

It should be noted that among 9th-grade pupils, there was a statistically non-significant increase in the mean maximum score for the first rank in the rating (from 4.73 ± 0.30 to 4.90 ± 0.44 points; $p > 0.05$), along with a statistically significant decrease in the minimum score assigned by respondents to particular values during the study (from 3.90 ± 1.22 to 2.43 ± 1.37 points; $p < 0.05$).

After the experiment, the ranking of values among 9th-grade pupils was distributed as follows: first place – an active and productive life (4.90 ± 0.44 points); second – self-development (4.77 ± 0.57 points); third – health (4.71 ± 0.60 points).

The ranking of instrumental values among 7th-grade pupils, which serve as means for achieving their terminal values, showed that at the beginning of the study the top three instrumental values were as follows: first place – cheerfulness (4.19 ± 0.48 points); second – neatness (4.17 ± 0.69 points); third – efficiency in activities (4.11 ± 0.63 points).

A detailed analysis of the data obtained before and after the experiment revealed a statistically significant increase ($p < 0.05$) in both the maximum (from 4.19 ± 0.48 to 4.51 ± 0.21 points) and the minimum (from 3.18 ± 0.83 to 3.94 ± 0.68 points) mean values of the ranking indicator of instrumental values.

Among the top three instrumental values, which represent the means for achieving long-term life goals, 7th-grade pupils demonstrated the following priorities after the experiment: first place – cheerfulness (4.51 ± 0.21 points); second – good manners (4.31 ± 0.51 points), sensitivity (4.31 ± 0.68 points), and neatness (4.31 ± 0.58 points); third – diligence (4.29 ± 0.53 points).

Among 8th-grade pupils, the top three instrumental values at the beginning of the pedagogical experiment were as follows: first place – good manners (4.23 ± 0.87 points); second – self-control (4.13 ± 0.79 points) and sensitivity (4.13 ± 0.91 points); third – rationalism (4.11 ± 1.04 points).

At the same time, the analysis of the data obtained before and after the experiment demonstrated a statistically significant increase ($p < 0.05$) in both the maximum (from 4.23 ± 0.87 to 4.59 ± 0.77 points) and the minimum (from 3.01 ± 1.22 to 3.85 ± 1.10 points) mean values of the ranking indicator of instrumental values.

Thus, by the end of the experiment, the ranking of instrumental values among 8th-grade pupils was as follows: first place – good manners (4.59 ± 0.77 points); second – sensitivity (4.32 ± 0.84 points), neatness (4.32 ± 0.76 points), and education/erudition (4.32 ± 0.98 points); third – cheerfulness (4.29 ± 0.94 points).

In the ranking of instrumental values among 9th-grade pupils at the beginning of the pedagogical experiment, broad-mindedness ranked first (4.69 ± 0.40 points); diligence ranked second (4.67 ± 0.90 points); and cheerfulness ranked third (4.60 ± 0.92 points).

The analysis of the data obtained before and after the experiment revealed a statistically significant increase ($p < 0.05$) in both the maximum (from 4.33 ± 0.40 to 4.83 ± 0.82 points) and the minimum (from 3.20 ± 0.60 to 3.89 ± 1.00 points) values of the instrumental values ranking indicator.

It was established that by the end of the pedagogical experiment, the distribution of instrumental values among 9th-grade pupils was as follows: first place – diligence (4.83 ± 0.82 points); second – education/erudition (4.75 ± 1.16 points); third – courage in defending one's opinion (4.66 ± 1.12 points).

Therefore, it was established that the technology we developed made it possible to create conditions for successful self-determination, the development of an active life position, and the enhancement of creative abilities among pupils in grades 7–9, as well as to foster their aspiration for active physical and spiritual self-improvement.

The dynamics of the degree of intensity of the need to achieve success in any activity were assessed using the methodology developed by Yu.M. Orlov.

It was determined that at the end of the pedagogical experiment, an increase in the degree of expressiveness of the need for success was revealed (in the 7th grade from 14.27 to 17.26 points; in the 8th grade from 13.56 to 17.07 points; in the 9th grade from 13.41 to 16.91 points).

At the same time, we found higher indicators of the need to achieve success among 7th grade pupils compared to 8th grade pupils, and among 8th grade pupils compared to 9th grade pupils (Table 1).

Calculation of the coefficient of variation at the end of the experiment showed an average degree of fluctuation in the results in the sample of 7th grade and weak variability of indicators in the sample of 8th and 9th grades.

The dynamics of theoretical knowledge was determined using 43 test questions with four answer options in accordance with the physical education curriculum. The test results are presented in Table 2.

It should be noted that at the beginning of the pedagogical experiment, 33.09% of pupils had a low level of theoretical knowledge; 44.05% of pupils had an average level; 19.59% had a sufficient level and only 3.27% had a high level.

At the end of the pedagogical experiment, a statistically significant ($p<0.05$) tendency towards an increase in the level of theoretical knowledge of pupils in all grades was identified. Thus, the percentage of pupils in 7th grade with a low level decreased from 31.43%

Table 1

Dynamics of indicators of the need for success (according to the methodology of Yu.M. Orlov) among pupils in 7th-9th grades during the experiment (n=100)

Statistical characteristics	7th grade (n=35)		8th grade (n=31)		9th grade (n=34)	
$\bar{x}$	14.27	17.26**	13.56*	17.07***	13.41	16.91
x_{min}	9.00	13.00	11.00	15.00	9.00	15.00
x_{max}	20.00	23.00	19.00	21.00	18.00	22.00
S	2.71	2.03	2.07	1.55	1.87	1.37
V	12.47	11.76	15.27	9.05	13.94	8.08
m	0.25	0.34	0.29	0.28	0.26	0.23

Notes: * – significant difference between the scores of 8th and 9th grade pupils at the beginning of the experiment ($p<0.05$); ** – significant difference between the scores of 7th and 8th grade pupils at the end of the experiment ($p<0.05$); *** – significant difference between the scores of 7th and 8th grade pupils at the end of the experiment ($p<0.05$)

Table 2

Level of theoretical knowledge of pupils in 7th-9th grades in physical education (n=100)

Level of knowledge	Grade	Research stage	Number of pupils	% of pupils	p
Low	7th (n=35)	Before	11	31.43	<0.05
		After	5	14.29	
	8th (n=31)	Before	12	38.71	<0.05
		After	1	3.22	
	9th (n=34)	Before	10	29.13	<0.05
		After	0	0	
Average	7th (n=35)	Before	15	42.86	>0.05
		After	13	37.14	
	8th (n=31)	Before	14	45.17	<0.05
		After	7	22.58	
	9th (n=34)	Before	15	44.11	<0.05
		After	9	26.48	
Sufficient	7th (n=35)	Before	8	22.63	>0.05
		After	11	31.43	
	8th (n=31)	Before	3	9.67	<0.05
		After	15	48.39	
	9th (n=34)	Before	9	26.48	>0.05
		After	7	20.59	
High	7th (n=35)	Before	2	3.08	<0.05
		After	6	17.14	
	8th (n=31)	Before	2	6.45	<0.05
		After	8	25.81	
	9th (n=34)	Before	0	0	<0.05
		After	18	52.94	

to 14.29%, and in 8th grade from 38.71% to 3.22%. No pupils with a low level were found among 9th grade pupils.

To determine the level of physical activity among schoolchildren in 7th-9th grades, a questionnaire entitled «My Physical Activity» was conducted. The results of determining the level of physical activity among schoolchildren are presented in Table 3.

A detailed analysis of the level of physical activity of 7th-9th grade pupils showed that in all classes during the pedagogical experiment, there was a statistically significant ($p<0.05$) decrease in the number of pupils with low levels of physical activity: in 7th grade – from 48.57% to 17.14%, in 8th grade – from 51.61% to 12.90%, and in 9th grade – from 47.06% to 20.59%.

Thus, it was found that at the end of the experiment, 54% of 7th-9th grade pupils already had a high level of physical activity. 29% of pupils had an average level. A low level of physical activity was still observed in 17% of schoolchildren.

Table 3

Level of physical activity among pupils in 7th-9th grades (n=100)

Level	Grade	Research stage	Number of pupils	% of pupils	p
Low	7th (n=35)	Before	17	48.57	<0.05
		After	6	17.14	
	8th (n=31)	Before	15	51.61	<0.05
		After	4	12.90	
	9th (n=34)	Before	16	47.06	<0.05
		After	7	20.59	
Average	7th (n=35)	Before	18	51.43	<0.05
		After	11	31.43	
	8th (n=31)	Before	13	37.14	>0.05
		After	9	29.03	
Average	9th (n=34)	Before	9	26.47	>0.05
		After	9	26.47	
High	7th (n=35)	Before	-	-	<0.05
		After	18	51.43	
	8th (n=31)	Before	3	19.36	<0.05
		After	18	58.07	
	9th (n=34)	Before	9	26.47	<0.05
		After	18	52.94	

The functional indicators for both genders after the experiment correspond to age norms. At the same time, according to the Ruffier test indicators, both boys and girls showed a statistically significant improvement in physical working capacity: in boys – from 11.41 a.u. to 7.53 a.u.; in girls – from 11.23 a.u. to 8.12 a.u. ($p<0.05$).

Research into functional indicators shows that, according to the Ruffier test results at the end of the experiment, 70% of boys and 76% of girls already had a sufficient level of working capacity. In addition, 12% of boys and 10% of girls already had an average level of working capacity. At the same time, unfortunately, 18% of boys and 14% of girls still had a level of working capacity that was rated as low.

To determine the degree of adolescents' accuracy in assessing their own physical development, the questionnaire by Ye.V. Bochenkova, «Self-Description of Physical Development», was used. It consisted of 70 items, which were distributed across the following scales: health, motor coordination, physical activity, body slenderness, athletic abilities, global physical self, appearance, strength, flexibility, endurance, and self-esteem.

It was found that during the pedagogical experiment, statistically significant ($p<0.05$) changes occurred in the level of self-assessment of physical development of schoolchildren in 7th-9th grades.

An analysis of the dynamics of self-assessment of physical development among 7th grade pupils revealed that the total score according to the self-description method of physical development among pupils changed from high (71.10%) to average (56.94%). At the same time, the maximum percentage value from the maximum statistically significantly decreased from 81.29% at the beginning of the experiment to 61.97% at the end.

Therefore, most schoolchildren already had a more realistic assessment of their own physical development indicators.

An analysis of the dynamics of self-assessment of physical development among 8th grade pupils also showed a change in the total score according to the self-description method of physical development among pupils from high (71.11%) to average (54.78%). The maximum percentage value from the maximum statistically significantly decreased from 83.00% at the beginning of the experiment to 59.75% at the end.

There were also positive changes in the dynamics of the self-assessment of physical development among 9th grade pupils. Their level of self-assessment of physical development, as measured by the total score, decreased from high (73.88%) to average (55.17%). The maximum percentage value decreased statistically significantly from 83.48% at the beginning of the experiment to 61.36% at the end.

No statistically significant differences in the level of self-assessment of physical development were found between 7th, 8th, and 9th grade pupils ($p>0.05$).

The dynamics of physical fitness were determined using the following tests: («Flamingo» balance test, «Lifting the torso from a lying position in 1 minute» test, «Bending the torso from a sitting position» test, which were conducted online (Table 4).

Analysis of the test results shows that the average indicators for all tests corresponded to age norms.

Table 4

Indicators of physical fitness dynamics of pupils in 7th-9th grades before and after the experiment (n=100)

Scales	Gender	Before the experiment			After the experiment			p
		$\bar{x}$	S	V	$\bar{x}$	S	V	
Lifting the torso from a lying position in 1 minute. number of times	G. (n=50)	31.74	6.89	21.71	43.58	5.17	11.86	<0.05
	B. (n=50)	37.41	7.14	19.09	50.19	4.21	8.39	<0.05
«Flamingo» balance test on the right. number of attempts	G. (n=50)	20.07	3.47	17.29	31.14	3.22	10.34	<0.05
	B. (n=50)	19.89	3.24	16.29	32.58	2.85	8.75	<0.05
«Flamingo» balance test on the left. number of attempts	G. (n=50)	14.52	1.52	10.47	25.27	2.17	8.59	<0.05
	B. (n=50)	16.34	1.65	10.10	29.71	3.02	10.16	<0.05
Bending the torso forward from a sitting position. number of times	G. (n=50)	10.39	5.27	50.72	19.36	4.18	21.59	<0.05
	B. (n=50)	7.26	4.43	61.02	13.70	5.42	39.56	<0.05

After the experiment, a reliable ($p<0,05$) increase in the studied tests was determined.

Consequently, the data obtained demonstrates the effectiveness of implementing personal physical culture training technology.

Discussion. The problem of developing personal physical culture in school-age children has been the subject of research by a significant number of scientists. Scientists have substantiated the principles and content of developing personal physical culture and value orientations [6, 17-20].

However, in accordance with the new State Standard of Basic Secondary Education, special attention is devoted to the formation of the physical and socio-psychological spheres of the individual through physical education, which highlights the problem of scientific justification for innovative approaches to the formation of personal physical culture [21].

Analysis of scientific and methodological literature and the results of a descriptive experiment made it possible to develop a technology for forming personal physical culture in adolescents based on a comprehensive approach to solving this problem.

The technology for developing personal physical culture included: prerequisites, goals, objectives, principles, areas of influence, organizational and pedagogical conditions for implementing the technology, criteria, and stages of implementation.

Scientists have developed scientifically based technologies that address specific aspects of personal physical culture development: a component technology for the ascension of a growing personality to spiritual values [22], a technology for preparing schoolchildren for independent physical exercise [23], technology for involving older schoolchildren in independent physical education [24], technology for forming motivation for systematic physical education [25], fitness technology for increasing the motor activity and physical fitness of adolescents [26], technology for forming a value-based attitude among students towards independent physical culture activities [27].

V. Sutula emphasizes the need to develop personal physical culture through the prism of a cultural approach [19].

Research into the effectiveness of our proposed technology for shaping adolescents' personal physical culture showed that changes in value orientations occurred during the experiment. In the ranking of terminal values among 7th and 8th grade pupils, the top positions were occupied by an active life, health, and self-confidence; among 9th grade pupils, the top positions were occupied by an active life, development, and health, which indicates a focus on personal growth.

A study of instrumental values showed that after the experiment, 7th grade pupils valued cheerfulness, neatness, good manners, and sensitivity; 8th grade pupils valued good manners, neatness, education, and sensitivity; and 9th grade pupils valued diligence, education, and courage in defending their opinions.

This is partly consistent with the research of Marchenko O.Yu. [8] and Bakiko I.V. [28].

Determining the need for success using the method developed by Y.M. Orlova showed that at the end of the pedagogical experiment, there was an increase in the degree of expression of the need for success (in 7th grade from 14.27 to 17.26 points; in 8th grade from 13.56 to 17.07 points; in 9th grade from 13.41 to 16.91 points).

It has been found that the competencies acquired by schoolchildren have improved their performance in terms of their need to achieve success.

During the pedagogical experiment, a reliable ($p<0,05$) increase in theoretical knowledge was recorded. In studies by Yelisieieva D. and Korzh N., it is also noted that the use of modern teaching methods contributes to an increase in the level of knowledge [24, 29].

Changes in the physical activity of adolescents were identified, and the number of children with low levels of physical activity decreased. The level of functional indicators in adolescents increased. This coincides with the data of scientists [7, 8, 19, 21, 23, 28, 29], who emphasize the need for the targeted use of

physical education methods, taking into account the individual needs and motivations of pupils.

The functional indicators in representatives of both genders after the experiment correspond to age norms. At the same time, according to the Ruffier test indicators, both boys and girls showed a statistically significant improvement in physical working capacity: in boys – from 11.41 a.u. to 7.53 a.u.; in girls – from 11.23 a.u. to 8.12 a.u. ($p<0.05$).

Research into functional indicators shows that, according to the Ruffier test results at the end of the experiment, 70% of boys and 76% of girls already had a satisfactory level of working capacity. In addition, 12% of boys and 10% of girls already had an average level of working capacity. At the same time, unfortunately, 18% of boys and 14% of girls still had a level of working capacity that corresponded to a low rating.

An analysis of changes in physical fitness indicators showed a significant increase ($p < 0.05$) in all tests.

Conclusions. For the formation of the values of physical culture in adolescents aged 14–15 and their further use in the process of self-improvement, the use of the developed innovative personal physical culture technology was proposed. When developing the innovative technology, the features of the motives, interests, value orientations, and physical condition of schoolchildren aged 14–15 were taken into account. The main provisions of this technology are: the formation of value orientations in physical education, a conscious attitude of schoolchildren towards physical culture and sports in order to build an individual trajectory of personal physical culture; the formation of a high level of practical skills in the use of physical exercises in various forms of physical education classes; the creation of conditions for successful self-determination, the development of an active life position and creative abilities of schoolchildren; the development of a desire for active physical and spiritual self-improvement.

Considerable attention was paid to broadening pupils' horizons by improving their theoretical knowledge of the basics of healthy lifestyles and the specifics of developing individual physical education and health programs for organizing independent physical activity.

The enhancement of theoretical training was implemented through participation in elective courses, physical education classes, consultations, and specially organized lectures delivered via distance learning in synchronous, asynchronous, and blended formats, taking into account the conditions of martial law.

The results of the formative pedagogical experiment proved the effectiveness of innovative technology for developing personal physical culture in improving the health of adolescents aged 14-15, as there was a statistically significant improvement in indicators of physical development, physical and theoretical preparedness, and motor activity of schoolchildren, which provides grounds for the practical implementation of the author's technology in the physical education system for older schoolchildren.

Conflict of interest. The author declares that there is no conflict of interest.

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Отримано/Received: 24.12.2025
Прорецензовано/Reviewed: 09.02.2026
Прийнято/Accepted: 19.02.2026
Опубліковано/Published – 30.03.2026

Як цитувати статтю / How to Cite:

Москаленко Д. Ефективність технології формування особистої фізичної культури старших підлітків. Спортивний вісник Придніпров'я. 2026 Бер 30;(2):71-82. https://doi.org/10.15802/2071-1476-2026-1-07

Moskalenko D. Effectiveness of the technology of forming personal physical culture of older adolescents. Sportyvnyi Visnyk Prydniprovia. 2026 Mar 30;(2):71-82. https://doi.org/10.15802/2071-1476-2026-1-07