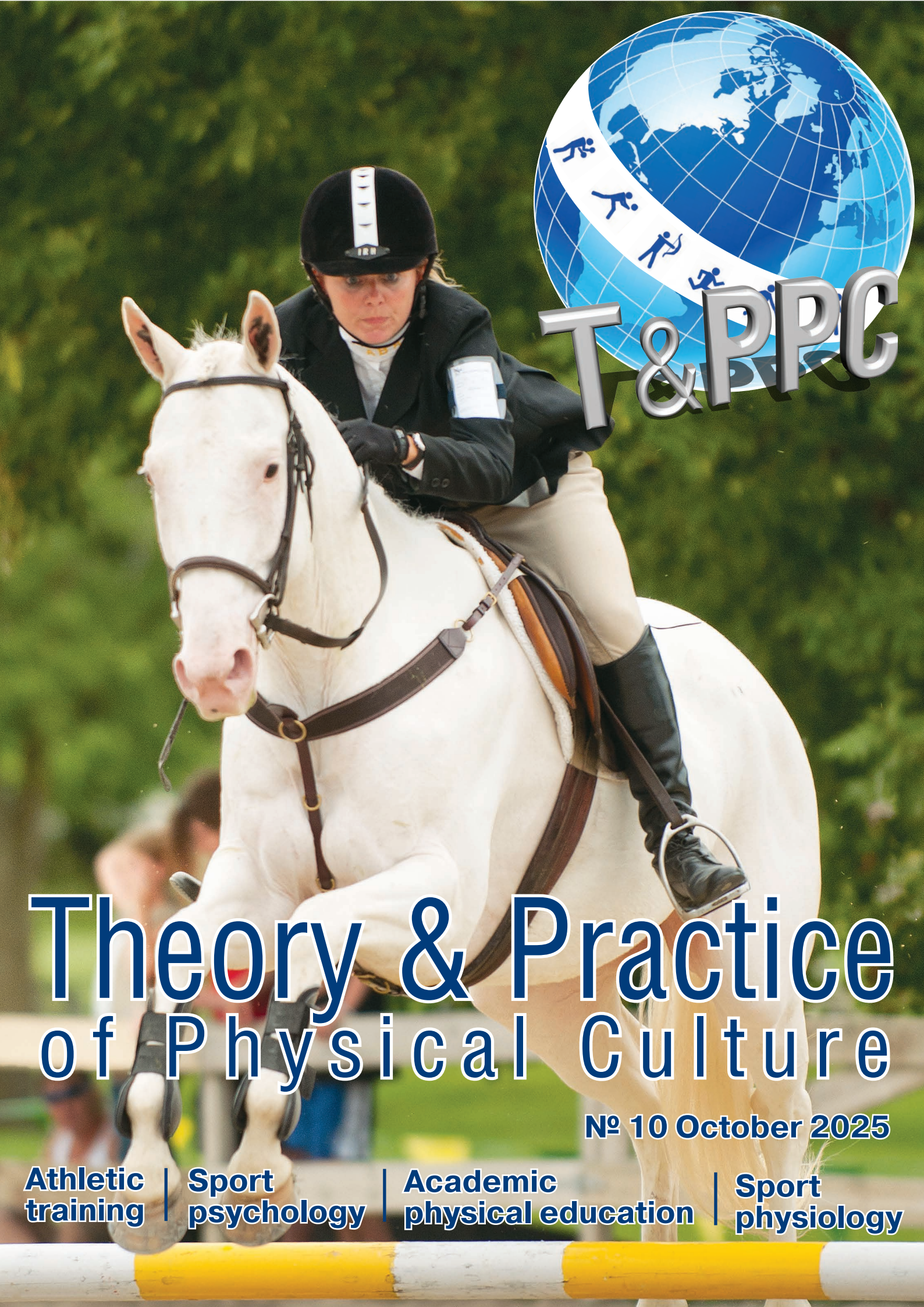

Theory & Practice of Physical Culture

№ 10 October 2025

Athletic training | Sport psychology | Academic physical education | Sport physiology

Professional – universal or narrow specialist: a bipolar model of variable training for physical culture personnel

In the world of modern professions, it is important to understand what kind of specialists are in demand on the labour market. On the one hand, employees must possess universal skills due to the rapid dynamics of the labour market, and on the other hand, they must have specific competencies. In particular, this dilemma affects the field of physical culture and sports.

The modern model of professional training for physical culture and sports personnel allows for the combination of two complementary areas: academic training and a practical focus on the development of relevant competencies.

As part of academic training, the learning process focuses on providing fundamental knowledge in the field of physical culture and sports and includes the study of natural sciences, social sciences and humanities, theory and methods of physical culture and sports training, medicine and history. The aim of the academic approach is to give future specialists a systematic understanding of the principles of how the body works, the laws of physical development, and teaching and training methods in the field of physical culture and sports. The main teaching methods used are lectures, seminars, practical laboratory work, working with scientific literature, and completing coursework and dissertations.

The academic focus of the educational process provides a solid foundation for the professional training of future specialists. The main advantages of such training are the development of analytical thinking skills in students, the ability to conduct scientific research, and the ability to adapt to new requirements and trends in the field of physical culture and sports. At the same time, the negative aspects of the academic focus of education may include a disconnect from the real requirements of the profession and insufficient development of practical skills in future specialists.

A practice-oriented approach to education focuses on the acquisition of practical skills and abilities necessary for effective work in the field of physical culture and sports. Priority in the curriculum is given to practical classes in sports, teaching and coaching practice, master classes and seminars. The aim of this approach is to develop the practical skills and abilities necessary for specialists to solve specific tasks in physical culture and sports, work with different groups of the population, and use modern technologies and equipment. One of the preferred teaching methods is project-based learning.

During practice-oriented work at the university, future specialists gain certain experience, which allows them to start working while still studying and develop motivation for the profession and further career growth. Along with the positive aspects, there are also disadvantages to this approach: poor mastery of fundamental knowledge, limited erudition, and the use of outdated teaching methods.

The harmonisation of academic and practice-oriented approaches in education creates the basis for the actualisation of a bipolar model of training future specialists in accordance with the demands of modern labour practice.

The bipolar model is implemented at a time when educational institutions are experiencing stagnation in the possibilities of traditional teaching and are beginning to search for new areas of growth in order to improve the quality of professional training. The harmonisation of the learning process is complemented by digital and innovative educational technologies, new management methods, and a focus on mastering new professions.

However, in a bipolar model of education, the focus may shift either towards academic studies or towards vocational training. In this case, it is important to manage the educational process flexibly and focus on areas with growth potential.

Based on the bipolar model for successful training of personnel in the field of physical culture and sports, an effective management tool could be an educational ecosystem based on monitoring the current needs of the labour market. Based on monitoring data, educational institutions will be able to update the variable component of the general education programme by changing courses depending on the situation in the labour market.

We invite scientists to publish the results of scientific research aimed at finding and studying the value meanings of physical culture and sports.

Editor-in-Chief of TPPC, Honored Worker of Physical Culture of the Russian Federation
Dr. Hab., Professor L.I. Lubysheva

Theory and Practice of Physical Culture

10'2025

Monthly Scientific-theoretical Journal, founded in 2013

ISSN 2409-4234

105122 Moscow,
Sirenevy blvd, 4.
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http://www.tpfk.ru

Theory and Practice of Physical Culture

Contents

Study of the dynamics of preparedness indicators for highly skilled kayakers during the training process

UDC 797.122

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Received by the editorial office on 23.05.2025

Abstract

Objective of the study is to identify the dynamics of technical and physical fitness indicators of highly skilled kayakers when performing various training loads during the preparatory period.

Methods and structure of the study. The work utilised methods of modelling, testing, analysis of planning documents, and mathematical statistics. The following indicators were measured: time taken to cover a distance of 2000 m (time, average rowing speed) and a distance of 2×250 m (average time, speed, stroke length and technical coefficient), bench press and deadlift with a 40 kg barbell in 2 minutes. Two groups (7 people in each) of highly qualified kayakers (Honoured Master of Sports of Russia, Master of Sports of Russia of international class, Master of Sports of Russia) were monitored as they trained according to 2 different plans during the preparatory period (October-December). Testing was conducted monthly.

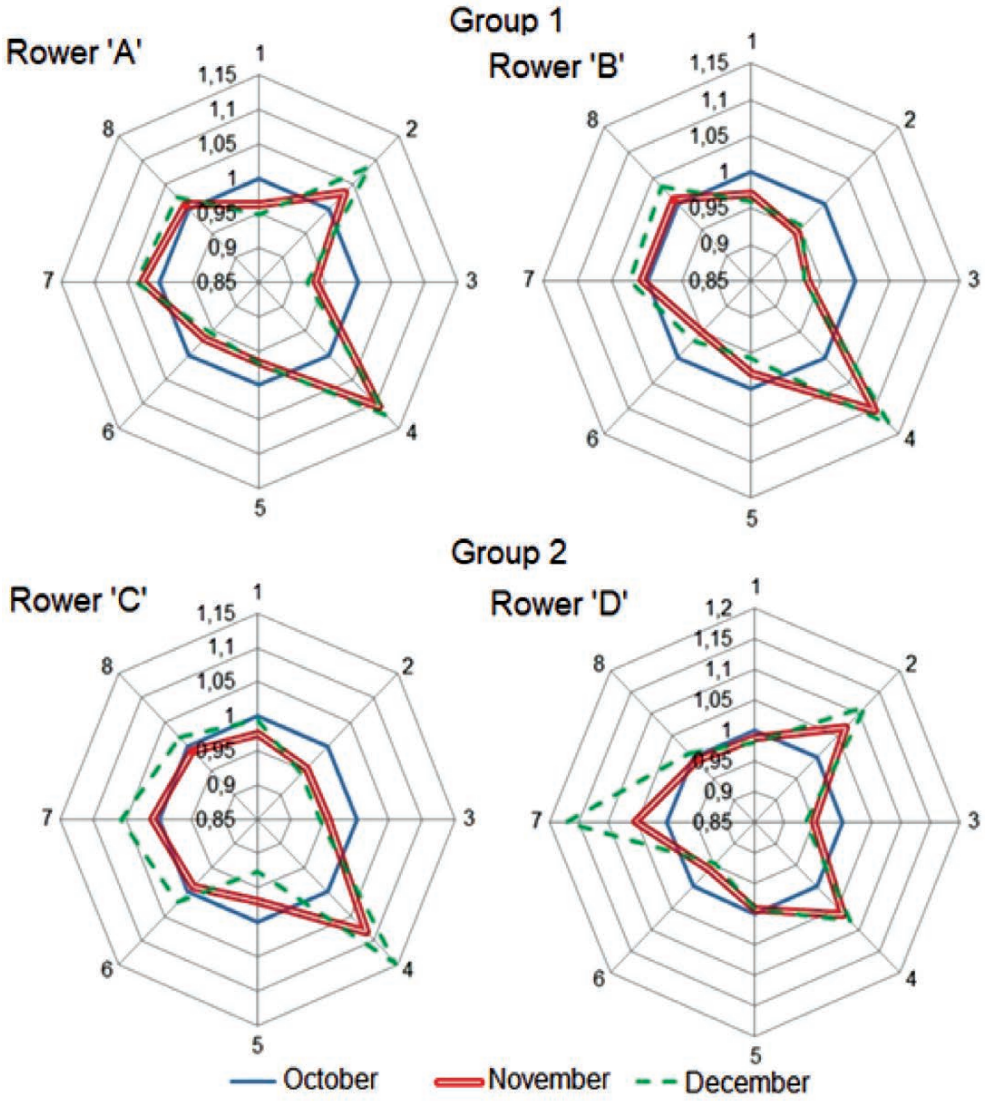
Results and conclusions. The content of training loads and the dynamics of technical and physical fitness indicators of highly skilled kayakers training according to different plans are shown. The assessment of the average group indicators of technical and physical fitness of rowers does not allow us to identify the nature of the influence of various training loads. The improvement in the time taken to complete the test distance by all rowers in both groups is the result of the implementation of the training loads under consideration, which initiate different changes in fitness indicators, which even within each group show individual characteristics of adaptive adjustments. For rowers of high skill level, it is advisable to consider the individual dynamics of fitness indicators in relation to training load.

Keywords: *training process, highly skilled kayakers, preparedness, performance dynamics.*

Introduction. One of the main components of coaches' activities is the selection of training loads that cause the changes in athletes' fitness levels necessary to achieve the set goals [2]. In rowing, this primarily refers to indicators of technical and physical fitness [3, 4]. An important aspect of the training process is the correct combination of group and individual work with athletes [1]. Therefore, a promising way to improve the effectiveness of rowers' sports training is to determine scientifically based training effects that take into account individually adapted responses in terms of urgency, intensity and direction. It is known that training loads that are identical in terms of their parameters, when refracted through the individual status of the athlete, cause different adaptive responses, often deviating from those planned. In turn, the same sporting result can be achieved using different training plans.

Objective of the study is to identify the dynamics of technical and physical fitness indicators of highly skilled kayakers when performing various training loads during the preparatory period.

Methods and structure of the study. The work utilised methods of modelling, testing, analysis of planning documents, and mathematical statistics. The following indicators were measured: time taken to cover a distance of 2000 m (time, average rowing speed) and a distance of 2 250 m (average time, speed, stroke length and technical coefficient), bench press and deadlift with a 40 kg barbell in 2 minutes. Two groups (7 people in each) of highly qualified kayakers (Honoured Master of Sports of Russia, Master of Sports of Russia of international class, Master of Sports of Russia) were monitored as they trained according to 2 different plans during the preparatory



1 – time for 2000 m; 2 – pace for 2000 m; 3 – time for 250 m; 4 – pace for 250 m; 5 – length of stroke for 250 m; 6 – technical coefficient for 250 m; 7 – barbell press in 2 min; 8 – barbell pull in 2 min.

Figure 1. Individual dynamics of indicators (c.u.) of rowers from both groups in the preparatory period

Table 1. Monthly training loads for highly skilled kayakers

Month	Rowing (km)						Gym training (min)	Run-ning (min)	Sports games (min)	GDE (min)	AT (MS) (tonnes)	AT (MV) (tonnes)
	Power zones					Total						
	1	2	3	4	5							
Group 1												
October	30,5	189	0	0	0	219,8	60	1015	140	590	124	40
November	127	240	47,2	2	3	419,2	390	770	150	330	125	160
December	133	234	53,5	3	5,5	428,5	280	1480	160	695	150	310
Group 2												
October	105	145	25	1	0	276	0	510	80	570	110	150
November	110	171	37	5	1	323	0	540	90	610	110	190
December	97	167	54	2	3	320	65	445	110	610	210	200

Notes: GDE – general development exercises; AT MS – athletic training (maximum strength); AT MV – athletic training (maximum volume).

period (October-December). Testing was conducted monthly.

Results of the study and discussion. An analysis of both training plan options showed that the number of training sessions was the same, but their content was different (Table 1).

For rowers in the first group, the emphasis was on rowing volume on the water, special training (training and rowing), running and game training, while for rowers in the second group, the emphasis was on rowing in the first, third and fourth power zones and athletic training. The training loads in both groups changed in content from month to month. Common to these changes for both groups was a gradual increase in the total rowing mileage and rowing in the second, third and fifth power zones, an increase in the time allocated to sports games, and an increase in the tonnage of loads in athletic training.

At the same time, in the monthly blocks (accumulative, transformative, implementation), there were peculiarities in the content of the loads: for rowers in the first group – a sharp increase in the proportion of rowing in zone 1, simulator training and athletic exercises performed in anaerobic conditions, and a sharp decrease in running load in November; for rowers in the second group, gym training only began in December and the volume of athletic training increased towards December, while the volume of running and game training decreased. At the end of each month, the technical and physical fitness of the rowers was tested (Table 2).

Table 2. Dynamics of rowers' test results during the preparatory period

Month	Indicators	2000 m		250 m				Barbell press for 2 min, number	Barbell pull for 2 min, number
		Time, s	Pace 2000 м, str/min	Time, s	Pace, str/min	Length of run, m	Technical coefficient		
Group 1 (n=7)									
October	M ± m	485,33±2,53	88,57±1,82	49,21±0,20	119,43±2,48	2,56±0,05	19,27±0,37	116,71±1,49	123,00±2,52
	Min	479,30	84,00	48,70	107,12	2,40	17,75	111,00	112,00
	Max	495,40	94,00	49,95	127,22	2,81	20,41	120,00	130,00
November	M ± m	471,91±3,35	89,00±1,94	46,51±0,39	129,59±2,87	2,50±0,05	18,69±0,44	118,43±1,73	122,86±1,98
	Min	462,50	85,00	45,25	117,67	2,33	16,89	112,00	114,00
	Max	481,20	96,00	48,10	139,48	2,75	19,89	125,00	129,00
December	M ± m	467,07±5,78	91,86±2,22	45,76±0,19	133,66±2,59	2,46±0,05	18,66±0,33	119,00±1,80	124,29±1,20
	Min	456,50	86,00	45,05	120,91	2,33	17,17	113,00	119,00
	Max	495,80	101,00	46,15	140,52	2,69	19,74	126,00	128,00
t (October-November)		3,19*	0,16	6,13***	2,68*	0,83	1,02	0,75	0,04
t (October-December)		2,89*	1,14	12,44***	3,97**	1,45	1,24	0,98	0,46
t (November-December)		0,72	0,97	1,73	1,05	0,53	0,05	0,23	0,62
Group 2 (n=7)									
October	M ± m	501,67±3,26	88,00±0,82	49,04±0,27	119,79±2,91	2,56±0,06	19,19±0,37	108,43±1,93	113,71±1,79
	Min	491,60	85,00	47,85	109,47	2,40	17,69	102,00	108,00
	Max	511,50	91,00	50,15	127,22	2,78	20,40	116,00	119,00
November	M ± m	491,21±4,75	89,57±1,60	46,44±0,36	130,85±3,35	2,48±0,05	18,80±0,38	109,86±2,37	114,43±1,90
	Min	478,60	85,00	45,50	118,00	2,30	17,52	103,00	107,00
	Max	504,60	95,00	48,05	140,60	2,66	20,09	118,00	120,00
December	M ± m	483,54±5,60	93,43±2,15	45,84±0,32	134,98±3,31	2,43±0,05	18,89±0,37	114,14±3,35	117,57±1,87
	Min	463,60	84,00	44,80	124,19	2,26	17,63	105,00	110,00
	Max	501,20	99,00	47,35	145,88	2,62	20,09	129,00	124,00
t (October-November)		1,82	0,88	5,76***	2,49*	1,07	0,74	0,47	0,27
t (October-December)		2,80*	2,36*	7,59***	3,44*	1,69	0,56	1,48	1,49
t (November-December)		1,04	1,44	1,25	0,88	0,59	0,19	1,04	1,18

*Notes: Min – minimum value; Max – maximum value; * - significant at p < 0,05; ** - significant at p < 0,01; *** - significant at p < 0,001.*

As can be seen from Table 2, the average group results of rowers who trained according to different plans showed a general trend. The improvement in the time taken to cover the distance by rowers in both groups was due to an increase in pace (except for the 2000 m distance for rowers in group 1, where the increase in pace was not significant). The changes in the time taken to cover the distance and the pace at both distances were more pronounced in the first two months. Other indicators characterising the level of technical and physical fitness did not show any significant changes. In other words, the average group analysis of changes in the technical and physical fitness indicators of rowers training according to different training plans does not allow us to determine the full range of parameters that ensure improved athletic performance. However, the data presented in Table 2 draws attention to the fact that, despite the insignificant difference between the maximum and minimum values of the time taken to cover distances of 2000 and 250 metres by rowers from both groups, there is a significant spread of values for other indicators.

For a more in-depth analysis, we examined the individual technical and physical fitness indicators of rowers from both groups during this period. As an example, we present the dynamics of the tested indicators of technical and physical fitness of two rowers from each group (Figure 1). The value of each indicator in October was taken as the baseline and expressed in conventional units (c.u.).

As we can see, for rower 'A', during the implementation of each block of the plan with a predominance of rowing and training equipment training, the improvement in the time taken to complete the 2000 and 250 m test segments was accompanied by an increase in rowing speed, a decrease in the length of the stroke and the technicality coefficient. Rower 'B', who trained according to the same programme as the first rower, also improved his times for the 2000 and 250 m distances, the rowing pace over the 250 m distance increased to a greater extent, the stroke length and technical coefficient decreased, but unlike the first rower, the rowing pace over the 2000 m distance decreased. In other words, the improvement in distance times observed in both rowers during the implementation of identical loads occurred against the backdrop of different changes in fitness indicators.

A similar pattern of individual differences was observed in the rowers of the second group, who trained according to a programme with a monthly increase in the volume of athletic and game training. For rower 'C', with improved results over 250 m, the indicators of rowing pace over 250 m, bench press and deadlift, and technical coefficient increased, but the length of the stroke and rowing pace over 2000 m decreased. Unlike rower 'C', rower 'D' significantly increases rowing pace over 2000 m and 250 m distances and barbell press, with no change in stroke length.

Thus, the improvement in the time taken to complete the test distance by rowers in both groups is the result of the implementation of the training load options under consideration, which initiate different changes in fitness indicators, which even within each group demonstrate the individual nature of the adaptive adjustments of the parameters under study.

Conclusions. Assessment of average group changes in the technical and physical fitness indicators of highly skilled kayakers does not allow us to identify the nature of the influence of various training loads and determine the parameters that contribute to the desired sporting results. For high-level rowers, it is advisable to consider the individual dynamics of fitness indicators in relation to training load.

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Study of physical fitness indicators in female athletes in artistic and aesthetic gymnastics: a comparative analysis

UDC 796.412.2

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Received by the editorial office on 24.06.2025

Abstract

Objective of the study is to conduct a comparative assessment of the physical fitness indicators of female athletes in sports improvement groups in artistic and aesthetic gymnastics.

Methods and structure of the study. The research was conducted at the Gracia Sports School in Ekaterinburg, with the participation of 14 gymnasts aged 14-15 who were competing at the sports improvement stage (7 of them were involved in artistic gymnastics and 7 in aesthetic gymnastics).

To assess the level of preparedness, standards for general and special physical training approved by the Federal Standards of Sports Training for the sports of 'artistic gymnastics' and 'aesthetic gymnastics' were used.

Results and conclusions. Based on the results obtained, it was found that aesthetic gymnasts have higher physical fitness indicators compared to artistic gymnasts. The most significant differences are observed in strength and endurance indicators. It is assumed that the results will be useful for identifying dominant physical qualities, managing the training process, selecting athletes when transitioning from artistic to aesthetic gymnastics, and making changes to the training process planning in national teams for these types of gymnastics.

Keywords: *gymnastics, physical fitness indicators, sports selection, training process.*

Introduction. Modern artistic gymnastics, as an Olympic sport, is developing in line with the patterns inherent in high-performance sports. The main trends in its development are a focus on high athletic performance, an increase in the volume and intensity of training, an increase in the complexity of competition programmes with compositions saturated with acrobatic elements, and early specialisation with a focus on achieving high results at a young age for particularly gifted athletes [1]. Increasingly stringent requirements are also being imposed on the morpho-functional indicators of gymnasts [2]. According to T.S. Lisitskaya, only 'rare athletes, possessing natural grace and harmony in their movements, are able to demonstrate in competitions the expressiveness and emotionality inherent in this sport.'

In view of the above, artistic gymnastics is losing its mass appeal and becoming a sport aimed at achieving high sporting results that bring athletes fame and financial prosperity.

It is evident that in recent years, aesthetic gymnastics, which combines elements of dance, acrobatics and artistic gymnastics, has been gaining popularity. There are no age restrictions in this sport, and elements of excessive flexibility and risk are not encouraged. In this sport, not all girls have ideal figures [4].

The relevance of the study is due to the fact that in recent years new types of gymnastics have appeared, and some of them (in particular, aesthetic gymnastics) attract athletes from other types (for example, artistic gymnastics). In addition, due to the increasingly complex rules, artistic gymnastics is becoming an inaccessible sport, including for those seeking to obtain the title of Master of Sports of Russia. As a result, many athletes are switching to aesthetic gymnastics in

order to improve their skills and prolong their sporting careers.

Objective of the study is to conduct a comparative assessment of the physical fitness indicators of female athletes in sports improvement groups in artistic and aesthetic gymnastics.

Methods and structure of the study. The research was conducted at the Gracia Sports School in Ekaterinburg, with the participation of 14 gymnasts aged 14-15 who were competing at the sports improvement stage (7 of them were involved in artistic gymnastics and 7 in aesthetic gymnastics).

To assess the level of preparedness, standards for general and special physical training approved by the Federal Standards of Sports Training for the sports of 'artistic gymnastics' and 'aesthetic gymnastics' were used: longitudinal split with the right and left legs from a 40 cm high support with a backward lean and a grip on the shin; cross split; from a supine position, legs forward, sit at an angle in a cross split, back vertical for 15 seconds; from a prone position, arms forward, parallel to each other, legs together, 10 backward bends in 10 seconds; jumping on both legs over a skipping rope with a double forward rotation for 20 seconds; from a standing position on the balls of the feet, arms to the sides, swing the right arm back, balance on one leg, the other leg in a 'ring' grip with the opposite arm.

Repeat the exercise with the other leg; balance on your toes with one leg forward and up, arms out to the sides. Hold for 5 seconds. Repeat with both legs; bend and extend your arms in a push-up position from a gymnastic bench; perform a bridge exercise on your knees. Starting position: narrow kneeling stance, legs together, arch back and touch the floor with your hands (hold position); forward roll, then backward roll (perform with both legs); side roll 'wheel' (perform 3 times in a row in a straight line). Perform on both sides1, 2.

Results of the study and discussion. The study identified key factors influencing the athletic performance of gymnasts, including physical training, biological factors (such as genetic predisposition), social and psychological factors, and nutrition. We paid particular attention to physical training, namely the development of strength, flexibility, endurance, and coordination skills. These physical qualities enable athletes to perform complex elements and demonstrate expressiveness and grace in their performances [3].

Figure 1 shows the average physical fitness results of gymnasts in sports improvement groups in aesthetic and artistic gymnastics. It can be noted that artistic and aesthetic gymnasts showed the same level in the following tests: longitudinal split with the right and left legs (5 points); cross split (5 points); 'from a standing position on the balls of the feet, arms out to the sides, swing the right arm back, balance on one leg, the other leg in a 'ring' position with the opposite arm' (5 points).

In three tests, aesthetic gymnasts have higher scores, namely in the following exercises: 'lying on your back, legs forward, sitting at an angle in a cross split' – 5.0 points for aesthetic gymnasts, 3.1 points for artistic gymnasts; in the exercise – narrow stance on knees, legs together, leaning back with hands touching the floor, aesthetic gymnasts scored 4.8 points, while artistic gymnasts scored 4.5 points.

Artistic gymnasts have a higher score in only one test – balance in a half-toe stand with one leg forward and up, arms out to the sides – 4.55 points, while aesthetic gymnasts score 4.15 points.

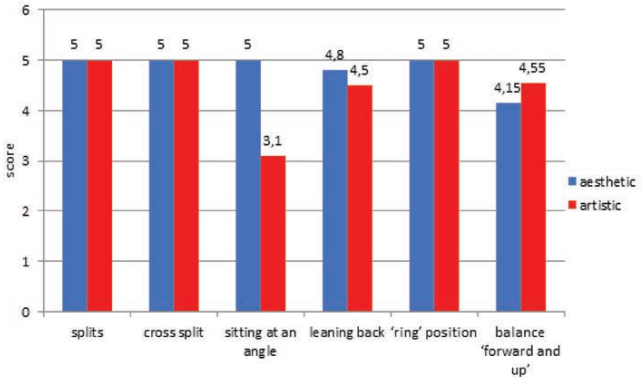

Figure 1. Results of physical fitness tests for gymnasts: splits, sitting, leaning and balance tests

Figure 2 shows the results obtained in the tests 'double forward jump rope with two feet' and 'arm flexion-extension in a push-up position from a gymnastic bench.' Athletes engaged in aesthetic gymnastics scored higher on both tests, by 27% and 19%, respectively.

[1] Order of the Ministry of Sport of the Russian Federation dated 15 November 2022 No. 984 'On the Approval of the Federal Standard for Sports Training in the Sport of Artistic Gymnastics' (Registered on 20 December 2022 No. 71709).

[2] Order of the Ministry of Sport of the Russian Federation dated 21 November 2022 No. 1037 'On the Approval of the Federal Standard for Sports Training in the Sport of 'Aesthetic Gymnastics" (Registered on 14 December 2022 No. 71502).

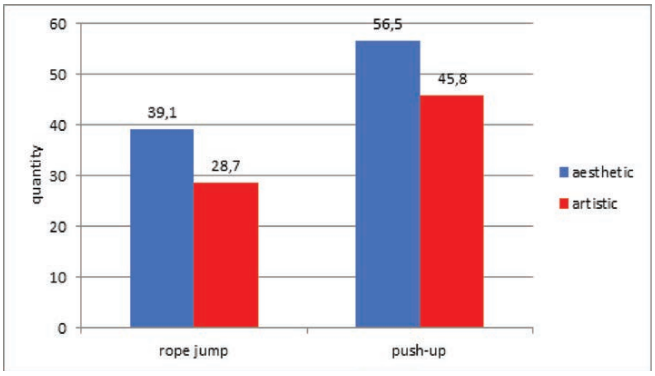

Figure 2. Results of physical fitness tests for gymnasts: jumps and push-ups

We believe that the higher results shown by aesthetic gymnasts in most tests can be explained by the fact that the competitive programme for this sport is more intense in terms of strength elements. It includes supports, pyramids, interactions, balance, jumps, turns and swings. Also, in aesthetic gymnastics, performances are longer than in artistic gymnastics.

Conclusions. Based on the analysis of the research results, we can note that aesthetic gymnasts have higher physical fitness indicators compared to artistic gymnasts.

The most significant differences are observed in the indicators of strength and endurance development in exercises such as: angle sit, back bends, jumping rope, and push-ups.

It was found that artistic gymnasts outperform aesthetic gymnasts only in the results of the test 'balance in a handstand with one hand forward and up, arms to the sides.' The rest of the test results are approximately the same for athletes in both groups.

The results obtained can be used to manage the training process of artistic and aesthetic gymnasts, as well as for sports selection and transition from artistic to aesthetic gymnastics.

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Features of organising sports training for men in media football

UDC 796:338.28

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Received by the editorial office on 25.05.2025

Abstract

Objective of the study is to identify the characteristics of the content of sports training components for men in media football.

Methods and structure of the study. An analysis of scientific and methodological literature on the research problem was conducted, and various aspects of the media football club's activities in the sports segment were studied. The pedagogical experiment and observations were conducted from February to November 2024 at the Russian amateur media football club Amkal in Moscow. The experimental groups consisted of 14 people, aged 21-41. Training plans, athletes' diaries and training loads during the preparatory period were also studied. Model characteristics of loads in micro- and mesocycles of the preparatory and competitive periods were introduced into the footballers' training programme.

Results and conclusions. The effectiveness of the training system, based on the Russian amateur media football club Amkal, was due to the creation of a set of interconnected and organised training factors, as well as maintaining the players' level of fitness during the competitive period.

Keywords: *media football, sports training, sports, footballers.*

Introduction. Currently, football is the most popular, widespread and accessible sport in all its forms. In the early 2000s, charity matches between professional footballers and film stars, politicians, artists, fans and amateurs began to be held around the world and in Russia. The emergence of such a phenomenon as media football in Russia in 2016-2018 was due to the activities of bloggers and streamers who shot videos and developed content for social networks [3].

In 2022, a media football league was created, with eight teams playing in the first season of the championship. In 2025, 20 teams are participating in the season, with the League Cup and Super Cup competitions being held and a Media League national team being created. On 9 November 2024, the final match of the Winline Media League Cup between Amkal and 2Drots set an attendance record of 30,322 spectators. Overall, media football has influenced the openness of professional football clubs and functions as a dynamically developing type of sports segment.

Media football is a type of football in which teams consist of popular bloggers, retired professional players, and amateur footballers [2]. A prerequisite for players in media football clubs is to have an audience of fans on social networks and at least 5,000 subscribers, and for teams, informational PR material positioning the club in the media. Media football has its own rules for pure playing time, bonus balls, penalty shootouts (a series of penalties or penalty kicks), sending players off the field for a maximum of 7 minutes, etc., which adds to the spectacle and makes it more like an entertainment show.

Despite the fact that media football, as a variety of football, is in the early stages of its historical development in Russia and worldwide, an important tool for

the field of sports science is the algorithm for creating content for scientific and methodological sources of information [1]. The selection and review of reflective practices in media publications and the systematisation of promising areas of research determine particularly valuable trends in the introduction of psychological and pedagogical innovations into the training process for this type of football.

Objective of the study is to identify the characteristics of the content of sports training components for men in media football.

Methods and structure of the study. An analysis of scientific and methodological literature on the research topic was conducted, and various aspects of the media football club's activities in the sports segment were studied. The pedagogical experiment and observations were conducted from February to November 2024 in two stages at the Russian amateur media football club Amkal in Moscow. The experimental groups consisted of 14 people, aged 21-41. Training plans, athletes' diaries and training loads during the preparatory period were also studied. Model characteristics of loads in micro- and mesocycles of the competitive period were introduced into the football training programme.

Results of the study and discussion. Systematisation and generalisation of the experience of leading media football coaches allows us to conclude that athletes are trained in accordance with the methodological recommendations of the programme in clubs and the requirements of the Federal Standard for Sports Training in Football. However, taking into account the different levels of players in the team, it is necessary to consider a unified approach to the organisation of the training system in media football (Table 1).

In the first stage of the study, in the basic cycle, the training loads for each type of training were determined and model characteristics of the athletes' loads for the preparatory period were introduced. Here is a brief description of them:

1. Physical training – 45%. In a weekly cycle, media footballers have approximately 4-5 training sessions lasting 1.5-2 hours and one match at the weekend. The ratio of general physical training to specific physical training is approximately 70-30%.

2. Technical training – 20%. With the help of special exercises, similar in structure and nature of execution, certain elements and technical techniques are improved.

3. Tactical training – 10%. The effective use of technical skills in changing game conditions influences individual, group and team actions and determines the tactical scheme of the game.

4. Theoretical training – 25%. For media footballers, an essential element of training is the creation of individual media content for players, an ecosystem of relationships within the team that fuels interest in the match, and the unpredictability of actions during competitions, which increases the spectacle and openness of clubs.

In the second stage of the study, in the second half of the season, during the competitive period, the model characteristics of the players were adjusted and refined, and their functional, morphological and psychological readiness was improved in order to achieve the highest sporting results. The volume of technical training was approximately 30%, physical and theoretical training 25% each, and tactical training 20%. The effectiveness of the training system, based on the Russian amateur media football club Amkal, was due to the creation of a complex of interrelated and organised training factors, as well as maintaining the achieved level of athletic form of the players during the competitive period.

Conclusions. As a result of researching the content of men's sports training in media football, the following features were identified: during the preparatory period, great attention is paid to the physical and technical training of players.

After the introduction of the experimental methodology, the indicators in the experimental group in-

Table 1. Training system in media football

Competition system	Training system	System of factors for optimising media coverage of training sessions and competitions
Regulations governing the conduct of athletes and referees	Physical training	System for selecting and recruiting athletes
	Technical training	Organisational factors for providing media content
Competition rules	Tactical training	Material and technical support
	Theoretical training	Financing and management factors
Competition calendar		Factors affecting the Russian football ecosystem

creased by 16% in terms of overall aerobic endurance, by 11% in terms of ball control speed, and by 8% in terms of ball striking accuracy. During the competitive period, the amount of physical activity decreased. Analysis of video footage of matches showed an increase in the number of successful technical and tactical actions in team ball selection, interceptions and pressing.

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Theoretical substantiation of the methodology of technical and tactical training of qualified freestyle wrestlers

UDC 796

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Received by the editorial office on 09.10.2025

Abstract

Objective of the study is to theoretically substantiate the methodology of technical and tactical training of qualified freestyle wrestlers.

Methods and structure of the study. To substantiate the methodology of technical and tactical training, a pedagogical experiment was conducted with the participation of freestyle wrestlers, the level of sports qualification - KMS, I category, light weight category. The pedagogical experiment was conducted on the basis of the Urmarskaya Secondary School named after A. F. Fedorov in the Urmarsky district of the Chuvash Republic.

Results and conclusions. The technique was developed for wrestlers of the game style, combined fighting in order to increase the variability of the use of technical and tactical actions when exposed to disruptive factors in competitive activities. In this regard, the most important aspect of an athlete's technical fitness is the ability to combine various techniques into a rational chain of motor actions (technical and tactical complex), depending on the situation specific to a particular moment of competitive activity. A rationally constructed technical and tactical set of actions makes it possible to optimally link together consistently applied local offensive and defensive actions, which ensures the achievement of a given final result, taking into account the opponent's behavior. One of the indicators of the quality of technical and tactical training (hereinafter referred to as TTP) is their ability to master a combination style of fighting, successfully perform complex technical and tactical actions (hereinafter referred to as TTD) that require a certain amount of time for their tactical training, and are associated with the danger of losing in the opponent's retaliatory actions. Reducing the time an athlete spends on TTD preparation significantly affects the reliability of the bout result.

Keywords: *methodology, technical and tactical training, technical and tactical actions, fighting style, individualization, freestyle wrestlers.*

Introduction. The steadily increasing level of achievements in wrestling and intense competition on the world stage raise the issue of improving the quality of training of qualified athletes.

In recent years, there have been significant changes in the content of competitive wrestling, the rules of competition, and ideas about the training methods of highly qualified athletes. At the same time, a very extensive set of changes and additions to the competition rules introduced in the UWW in 2013 had a mostly positive effect, significantly increasing the activity and entertainment of wrestling matches and creating conditions for wrestlers with superior technical and tactical training to demonstrate their capabilities [3, 6].

In modern wrestling, the time of the bout has been shortened, the wrestling process has become faster and more active, continuous attacking actions are encouraged, which requires wrestlers to solve tactical and technical problems as quickly as possible, using attacking combination actions. However, it is noted that the existing methodology of technical and tactical training does not sufficiently take into account the requirements of modern wrestling [2]. Timely receipt of objective and comprehensive information in the

process of competitive activity makes it possible to assess current trends and directions of technical and tactical training, taking into account regular changes in the rules of competition [1, 4, 5].

Objective of the study is to theoretically substantiate the methodology of technical and tactical training of qualified freestyle wrestlers.

Methods and structure of the study. To substantiate the methodology of technical and tactical training, a pedagogical experiment was conducted with the participation of freestyle wrestlers, the level of sports qualification – KMS, I category, light weight category. The pedagogical experiment was conducted on the basis of the Urmarskaya Secondary School named after A. F. Fedorov in the Urmarsky district of the Chuvash Republic.

Results of the study and discussion. To substantiate the upcoming experimental studies, an analysis of competitive activity in modern freestyle wrestling has been carried out. The latest rules have been studied, which came into force in 2019 with changes in 2022, which were approved by the United World of Wrestling (UWW). Since the share of points won when an opponent is transferred to the stalls doubles, it is concluded that the increasing role and need for further improvement of the teaching methodology for variable technical and tactical actions in the stand is increasing.

When the judge determines a passive wrestler, he is given a 30-second time interval to attack. If a passive wrestler performs a technical action, he is awarded points for this action. If an active wrestler performs a technical action, he is awarded points for this technical action, plus one point for activity. In the absence of technical actions, an active wrestler gets a point.

If a wrestler's "escape" is detected during a bout, the escaping wrestler will receive a warning, and his opponent will be awarded points for a technical action, plus one more point for the opponent's escape.

Most wrestling experts identify the 3 most pronounced styles: game, tempo, and power. In practice, wrestlers of the "game style" are more "technical" and mostly prefer combination wrestling, thereby creating a large margin of winning points. Wrestlers of the "tempo style" are usually extremely hardy and use "high tempo" in their tactics, thereby "exhausting" their opponent. Athletes of the "power style" mostly attack with "defensive" techniques, most often they finish fights ahead of schedule "on the carcass", but they are less resilient.

For wrestlers of the "game style" (relatively short and medium height), we have proposed a tactical plan model that includes attacking actions from a medium distance, leg grapples, various knocks with the hooks of the opponent's legs, hooking and tripping. In the educational and training activities of wrestlers, when improving the "combination (game) style" of fighting, it is recommended to simulate the competitive situation of wrestling matches in the following sequence:

- improve the ability to impose your own manner (style) of fighting;
- persistently implement your tactical plan;
- recognize the opponent's manner (style) of fighting, his strengths and weaknesses;
- to counter the opponent with your tactical plan aimed at neutralizing his strengths and exploiting his weaknesses.

Table 1 - Means of technical and tactical training of qualified freestyle wrestlers

<table>
<tr><th colspan="3">1. Exercises to improve the model of the tactical plan "Gamer" (TTK1, TTK2, TTK 3, TTK 4)</th></tr>
<tr><td rowspan="2">Technical element</td><td colspan="2">Technical and tactical actions</td></tr>
<tr><td>Technical action</td><td>Tactical operation</td></tr>
<tr><td rowspan="2">The main provisions of the wrestler
Distances
Ways of movement and directions of maneuvering
Captures
Auxiliary elements of foot fighting</td><td>Receptions
Protective actions
Counter-recepts</td><td>Disclosing
Bringing out of balance
Threat
Suddenness
Re-attack
Challenge
Distraction
Constrapment</td></tr>
<tr><td colspan="2">COMBINATIONS (VARIATIONS)</td></tr>
<tr><td colspan="3">Special game complexes</td></tr>
<tr><td colspan="3">Fights (3X3, 4x3, 6x3)</td></tr>
</table>

We have developed a technique for technical and tactical training of qualified freestyle wrestlers. The technique was developed for wrestlers of the game style with a primary focus on combinational fighting.

The purpose of the methodology is to increase the variability of the application of technical and tactical actions when exposed to disruptive factors in competitive activities.

One of the first researchers of the variability of technical and tactical actions in wrestling, who substantiated the "funnel principle", is A.A. Novikov. According to this principle, the wrestler must master a wide range of skills for entering the reception and relatively stable execution of the reception itself. The "funnel principle" makes it possible to understand the expediency of consistently complicating exercises in the preparation process: from a model version with a "convenient" partner in a favorable situation to the gradual introduction of one, two or more confusing factors with the formation of an individual performance option. When exposed to a certain confounding factor, according to the degree of deviation of skill parameters from the individual structure, it is possible to determine ways to increase the reliability of execution. Great variability is allowed in the preliminary actions (methods of tactical preparation of the reception), and the final reception should be carried out with the greatest possible accuracy.

That is, the wider the first part of the "funnel", the more effective, reliable and stable the basic skill is. The lower the athlete's fitness and skill, the less the variability of the approach and the less clearly the basic skill is manifested. At the same time, high-class athletes have the ability to maintain the stability of the leading parameters of technical action due to the variability of non-essential ones (Table 1). In this regard, the most important aspect of an athlete's technical fitness is the ability to combine various techniques into a rational chain of motor actions (technical and tactical complex), depending on the situation specific to a particular moment of competitive activity. A rationally constructed technical and tactical set of actions makes it possible to optimally link together consistently applied local offensive and defensive actions, which ensures the achievement of a given final result, taking into account the opponent's behavior.

The improvement of technical and tactical training was planned in the preparatory and competitive periods for the main part of the training session. At the same time, in the first half of the main part, individual fragments of attacking and counterattacking actions were improved (respectively, TTK 1-4), in the second half, three-minute fights were used according to the 3x3, 4x3 or 6x3 scheme.

In the first six weeks of the pedagogical experiment, the workload was increased, and in the following weeks, the intensity was increased while the volume remained unchanged.

When improving the performance of technical and tactical actions, the kinetic energy of the attacker's body weight was used; repeated spurt attacks with an interval of 15-25 seconds; improvement of the lever mechanism when creating a pair of forces that overturn an opponent; creation of favorable situations for launching an attack by restraining, unbalancing, false attacks and maneuvering; expansion of the variability of preliminary technical actions and stabilization of equipment performing a crown technique (a technique that has been perfected to perfection).

Here are the options for combining the "mill" technique:

1. The attacker performs a pass to the legs with his head in or out. The opponent responds with a defense by grabbing his hand by the wrist. The attacker uses this hold to continue his attack and performs a windmill throw.

2. The attacker attempts to make a catch throw. The opponent, defending himself, straightens up, leaning back as much as possible, and opens up. At this point, the attacker throws a mill.

3. The attacker performs a dive under the arm, trying to grab the near (opposite) thigh. The opponent defends himself by putting the attacked leg back, leaning back and leaning forward strongly, resting on his feet or knees and turning to the attacker with the other side. The attacker, using this position of the opponent, seizing the far (opposite) hip, makes a throw with a mill.

4. The attacker makes an attempt to make a mill throw. The opponent, defending himself, leans back so that it is impossible to grab his legs. The attacker moves to capture the torso from the side and performs a mill throw or transfers the opponent to the stalls.

The specialized game complexes include the following games: 1) touching a pre-determined part (point) of the partner's body; 2) blocking grips (one of the partners, having completed a certain grip, must hold it, the other must free himself from this grip); 3) attacking grips (it is necessary to carry out one of the pre-determined grips, hold it or perform an action);

4) crowding (push out of a certain area); 5) openings (start a duel while in various poses and positions); 6) tug-of-war (in the grip of hands, objects); 7) getting ahead of yourself and fighting for an advantageous position (lying on your back, on your side, with your feet or head towards each other, kneeling, on a signal to go behind your back or put on your shoulder blades); 8) maintaining balance (in various positions to unbalance your partner); 9) lifting your opponent off the mat in various positions seizures.

Games of crowding. The basic rules of the competition are held on playgrounds (carpets) outlined in a circle with a diameter of 6, 4, 3 and in squares of 4x4, 2x2, 2x2 m, 2) everyone participates in the competition, the number of game attempts (duels) – 3, 5, 7, 3) defeat for kicking outside the square, touching the foot (hand) the features limiting the area of martial arts

The complication is to start a duel by being in different poses and positions in relation to each other.

Unusual positions: a) back to back, 6) left side to left, c) right side to right, d) left side to right, e) right side to left, f) rivals separated – met, g) one partner on his knees, the other – standing, h) both rivals on i) the opponents are lying on their backs (left side to right and vice versa), k) the opponents are standing on the bridge (left side to right and vice versa). The directions of complication of the starting positions are a) the arms are straight at the top, 6) the arms are connected in a "hook" above the head, c) the arms are straightened along the body, d) the arms are connected in a "hook" behind the back.

The options for starting fights are that the opponents touch each other, do not touch each other (a distance of up to half a meter is acceptable). The winner is the one who forced the opponent to step outside the circle (step on the line), touch a pre-specified part of the body, was behind his back, knocked to his knees.

The ways to complicate the conditions for performing techniques and actions are: 1) expanding the options for initial intermediate and final positions, preparatory actions; 2) limiting or expanding the spatial boundaries of techniques and actions; 3) limiting the time intervals of actions; 4) complicating the conditions for orientation in space and time; 5) performing techniques and actions in unusual conditions (site coverage, shape, mass and details sports equipment, time of day, climatic conditions); 6) options for resistance of a conditional opponent; 7) inadequate responses from partners.

Conclusions. Thus, the technique of technical and tactical training developed by us is intended for wrestlers of the game style, the combinational nature of the duel. The technique included technical and tactical complexes – the ability to combine various techniques into a rational chain of motor actions, depending on the situation specific to a particular moment of competitive activity and ways of complicating TTD.

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The relationship between technical and physical fitness parameters in swimmers aged 13–14

UDC 797.212.4

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Received by the editorial office on office on 30.06.2025

Abstract

Objective of the study is to determine the degree of influence of physical fitness on the kinematic and dynamic parameters of swimming technique in young swimmers aged 13-14.

Methods and structure of the study. To assess physical fitness, tests from the Federal Standard for Sports Training in Swimming for the training stage were used, in which 85 swimmers aged 13-14 and with I-II sports qualifications took part. Technical readiness was assessed based on kinematic and dynamic indicators. The data was processed using mathematical statistics methods.

Results and conclusions. The data obtained allows us to propose a new conceptual model of the relationship between the physical and technical preparedness of young swimmers, where strength and speed-strength qualities are the basic factors determining the potential for technical mastery. Coordination abilities perform a modulating function, optimising the realisation of strength potential. Flexibility and general endurance play a supporting role, the importance of which may increase at later stages of athletic development. The identified patterns are of practical importance for the construction of the training process. An emphasis on the development of strength and speed-strength qualities in combination with the improvement of intermuscular coordination may become a key direction for optimising training methods for 13-14-year-old swimmers.

Keywords: *physical fitness, technical readiness, regression analysis, kinematic parameters, dynamic parameters, physical qualities, young swimmers.*

Introduction. The modern system of sports training for young swimmers is based on the integration of physical and technical training, which allows them to achieve high results in competitions [2]. Physical qualities such as strength, endurance and coordination play a key role in the formation of technical skills [1]. However, despite a significant amount of research in this area, the relationship between specific physical indicators and swimming technique parameters remains understudied [2]. This is particularly relevant in youth sports, where the foundations for future achievements are laid.

For young swimmers aged 13-14, who are in the stage of actively developing motor skills and biomechanical stereotypes, the coach's understanding of these relationships is a key factor in optimising the training process. Despite the existence of individual studies devoted to both physical and technical training of young swimmers, the nature of the relationship between these types of training remains insufficiently studied [3, 7]. In particular, the influence of general and specific physical fitness parameters on the kinematic structure of the stroke is poorly understood. Filling this gap could contribute to the development of more effective training methods based on the individual characteristics of young athletes, which in the long term will minimise the risk of technical errors and improve performance during the specialised training stage.

Objective of the study is to determine the degree of influence of physical fitness on the kinematic and dynamic parameters of swimming technique in young swimmers aged 13-14.

Methods and structure of the study. 85 young swimmers aged 13-14 with I-II sports qualifications took part in the analysis of technical preparedness, and kinematic and dynamic parameters were consid-

Table 1. Regression statistics for physical and technical fitness indicators for swimmers aged 13–14

Technical parameters	Coefficient	Standard error	T – stat.	p
1000 m run				
Kinematic	0,19	0,25	0,76	>0,05
Dynamic	0,60	0,35	1,71	>0,05
Medicine ball throw				
Kinematic	0,15	0,20	0,75	>0,05
Dynamic	0,02	0,05	0,40	>0,05
Twists				
Kinematic	1,50	1,60	0,94	>0,05
Dynamic	1,20	1,45	0,83	>0,05
Bend				
Kinematic	0,45	0,50	0,90	>0,05
Dynamic	0,40	0,45	0,89	>0,05
Push-ups				
Kinematic	0,55	0,18	3,06	<0,001
Dynamic	0,60	0,15	4,00	<0,001
Standing long jump				
Kinematic	0,30	0,12	2,50	<0,001
Dynamic	0,35	0,10	3,50	<0,001
Sliding				
Kinematic	0,25	0,08	3,13	<0,001
Dynamic	0,30	0,07	4,29	<0,001
3x10 m shuttle run				
Kinematic	0,20	0,07	2,86	<0,001
Dynamic	0,25	0,06	4,17	<0,001
Romberg test				
Kinematic	0,10	0,20	0,50	>0,05
Dynamic	0,05	0,25	0,20	>0,05
8x50 m using the basic technique				
Kinematic	0,40	0,15	2,67	<0,001
Dynamic	0,45	0,16	2,81	<0,001
Starting reaction speed				
Kinematic	0,08	0,15	0,53	>0,05
Dynamic	0,06	0,18	0,33	>0,05
Average competition speed				
Kinematic	0,50	0,18	2,78	<0,001
Dynamic	0,55	0,20	2,75	<0,001
Static strength when simulating rowing on land				
Kinematic	0,35	0,12	2,92	<0,001
Dynamic	0,40	0,13	3,08	<0,001
Absolute pulling strength				
Kinematic	0,45	0,12	3,75	<0,001
Dynamic	0,50	0,13	3,85	<0,001

ered. Computer video analysis, described in detail in the work of Arishin A.V. [1], was used to evaluate the kinematic parameters of the stroke technique.

A set of tests was used to assess physical fitness: general endurance – based on the results of a 1000 m run, strength – based on the number of push-ups in 30 seconds and the distance of a medicine ball throw, speed and strength – based on the results of a standing long jump and a 3x10 m shuttle run, flexibility – based on the results of a forward bend, special physical fitness – Romberg test, exercises with a gymnastic stick, 8x50 m swimming using the basic technique, start reaction speed, average competitive speed, static strength when simulating rowing on land, absolute pulling strength. Statistical data processing was performed using Statistics software with descriptive statistics, normality of distribution testing, and multiple regression analysis [6].

Results of the study and discussion. The data obtained demonstrate a marked differentiation in the influence of various physical qualities on the kinematic and dynamic characteristics of swimming technique in athletes aged 13–14. Regression analysis of physical and technical fitness indicators revealed a number of statistically significant correlations that can be used to optimise the training process (Table 1).

Physical fitness indicators assessed in push-up, standing long jump and gliding tests had the greatest impact on the kinematic and dynamic parameters of swimming technique ($p<0.05$). This indicates that the development of upper shoulder girdle muscle strength (push-ups), explosive leg muscle strength (jumping) and push-off strength when gliding in water play a key role in the technical development of young swimmers, which is consistent with previous studies emphasising the importance of strength training in swimming [1, 3].

Such a pronounced correlation is probably due to the critical importance of developing upper shoulder girdle, torso and leg muscle strength during puberty, when the muscle corset necessary for effective stroke movements is actively forming.

It should also be noted that the greatest prognostic value was demonstrated by the strength training indicators of swimmers, which exceed similar indicators obtained in the studies by Chen L. [4].

The results of tests such as the 1000 m run and the medicine ball throw did not show a significant effect on technical parameters ($p>0.05$), which may be due to their lower specificity for this sport. For example, long-distance running, although it develops general endurance, does not have a direct impact on stroke technique or body position in the water. Similarly, throwing a stuffed ball, which is aimed at developing the strength of the arms and torso but does not imitate rowing movements, has a weak correlation with the dynamic and kinematic parameters of swimming. These results are consistent with studies indicating the need for specialised exercises that are as close as possible to competitive activity [1, 2].

Analysis of speed and strength qualities revealed a linear relationship between standing long jump results and technical parameters ($p<0.001$), which contrasts with the logarithmic model described in the works of Smith A. [7]. This discrepancy can be explained by the use of more accurate instrumental methods of technique assessment in our study, as well as changes in modern training programmes that pay more attention to the development of explosive strength.

Of particular interest are the data related to average competitive speed ($p<0.001$). This confirms the hypothesis that technical preparedness, including stroke efficiency and coordination of movements, directly affects athletic performance. A similar pattern was observed for the 8×50 m freestyle test ($p<0.001$), which emphasises the importance of speed-strength endurance in swimming. The data obtained are consistent with studies that note that a combination of technical skill and physical fitness is a key factor for success in middle- and short-distance swimming [4, 5].

In addition, regression analysis revealed that some tests, such as the Romberg test and start reaction speed, did not show a significant correlation with technical parameters ($p>0.05$). This may be due to the fact that these indicators reflect specific aspects such as balance or reaction to the start signal, which, although important for competitive activity, do not directly influence swimming technique in its classical sense. This fact confirms the hypothesis about the predominant influence of coordination on the spatial-temporal organisation of movements in water [5].

The data obtained on flexibility indicators are also of particular interest. In contrast to the results of Williams et al. [8], our study did not reveal any statistically significant correlations between traditional flexibility tests and swimming technique parameters ($p>0.05$). This paradox can be explained by several factors: the use of different and insufficiently specific tests, the age characteristics of the subjects (puberty), or changes

in modern swimming techniques, which place fewer demands on maximum joint mobility.

Conclusions. Thus, the data obtained allows us to propose a new conceptual model of the relationship between the physical and technical preparedness of young swimmers, where strength and speed-strength qualities are the basic factors determining the potential for technical mastery. Coordination abilities perform a modulating function, optimising the realisation of strength potential. Flexibility and general endurance play a supporting role, the importance of which may increase at later stages of athletic development.

The identified patterns are of practical importance for the development of the training process. An emphasis on the development of strength and speed-strength qualities in combination with the improvement of intermuscular coordination may become a key direction for optimising training methods for 13-14-year-old swimmers.

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Elements of functional training in volleyball training sessions for young women aged 16-17

UDC 796.32+796.072

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Received by the editorial office on 03.07.2025

Abstract

Objective of the study is to experimentally prove the effectiveness of volleyball training sessions with elements of functional training for young women aged 16-17.

Methods and structure of the study. Two groups of subjects participated in the 9-month scientific study: an experimental group (n=12), whose training process was based on the integration of functional training elements, and a control group (n=11), which followed a traditional training method.

Results and conclusions. The volleyball players in the experimental group showed statistically significant improvements in speed-strength and coordination indicators, manifested in jumping, throwing, special running exercises and trunk lifts. The results of the study demonstrate a marked positive trend in the experimental group: the increase in physical fitness indicators varies between 5.55% and 29.51%, while the control group showed less significant progress, confirming the effectiveness of functional training, including plyometrics, balance exercises, and medicine ball work in the training process. Experimental studies have shown that functional training significantly improves the special physical training of volleyball players; the greatest increase was noted in agility (36.65%) and torso strength (29.17%); the technique helps prevent injuries by improving jumping and landing techniques. The study is relevant for coaches and specialists in the field of sports training, offering scientifically based methods for optimising the training process.

Keywords: *young women aged 16-17, training, volleyball, teaching methods, functional training.*

Introduction. Currently, the focus of volleyball training is on the effective implementation of game movements and organisation, taking into account modern methods of teaching technique, tactics and the development of the body's functional capabilities, on which the manifestation of motor abilities depends [1, 6]. The choice of training methods and techniques should be diverse and based on knowledge of the requirements for the motor and functional preparedness of athletes specialising in game sports [2]. Improving the quality of functional training for athletes in game disciplines remains a pressing issue in modern training. Recently, functional training has been considered an effective means of developing motor skills in certain sports [3, 4, 5, 7].

Objective of the study is to experimentally prove the effectiveness of volleyball training sessions with elements of functional training for young women aged 16-17.

Methods and structure of the study. As part of the experimental study, a comprehensive theoretical and methodological approach was implemented, combining: a systematic review of scientific publications and methodological developments on the problem under study; methods of structured pedagogical observation with recording of dynamics of indicators, ascertaining and formative experiments, control-pedagogical tests and mathematical-statistical processing of the obtained materials. Particular attention was paid to the study and analysis of existing training methods in volleyball, which made it possible to develop an original experimental training method that integrates elements of functional training.

Volleyball players participating in the programme using elements of functional training were included in the experimental group (n=12). Training sessions in the control group (n=11) were carried out according

to the standard programme. The pedagogical experiment lasted 9 months, during which classes were held 3 times a week for 2 hours.

During the study, the athletes' physical indicators were monitored in stages using specialised control and pedagogical exercises. To ensure the reliability of the results, the following methods were used: pairwise comparison of initial and final data and assessment of the statistical significance of differences between groups, which ensured the scientific novelty and practical significance of the study.

Results of the study and discussion. The initial data on the coordination and speed-strength abilities of volleyball players obtained during the ascertaining stage of the study are presented in Table 1. The indicators of athletes in the experimental and control groups demonstrate a comparable level of preparedness at the initial stage of the experiment.

The statistical analysis did not reveal any significant intergroup differences ($p>0.05$) in the indicators of special physical fitness between the participants of the experimental and control groups, which confirms the initial homogeneity of the sample and provides a complete basis for their comparison in the process of the formative pedagogical experiment.

It should be noted that the effectiveness of volleyball training sessions with elements of functional training is confirmed by a reliable improvement in the indicators of the experimental group in the following control and pedagogical exercises: long jump and vertical jump, medicine ball throws, sit-ups from a supine position in 10 seconds (Table 2). The control group showed positive dynamics in physical fitness in all test indicators, but these changes are not statistically significant. After the formative experiment, significant changes were found in the results of the special jumping ability of volleyball players in the experimental group in the long jump and standing jump, which confirms the effectiveness of plyometric exercises, medicine ball jumps in combination with squats on an unstable surface ($t=2.500$ and $t=2.207$, respectively).

These functional training methods create favourable conditions for improving various types of jumping techniques and correct landing during the game, which in turn serves as a means of preventing injuries to the musculoskeletal system. Significant differences in the experimental group of volleyball players were found in lifting the torso from a supine position in 10 seconds ($t=2.187$) and throwing a medicine ball ($t=2.077$), the results of which improved on average by 2.09 times and 2.48 metres, respectively, confirming the effectiveness of exercises for balance, back and abdominal muscles (core) with medicine balls of different weights and expanders.

At the end of the pedagogical experiment, the subjects in the experimental group showed statistically significantly higher scores on all test exercises. In particular, in the standing long jump, the volleyball players in the experimental group showed a higher result by 13.4 cm ($t=3.441$), in the vertical jump – 3.8 cm ($t=3.656$), in the medicine ball throw – 1.05 m ($t=2.277$), the 92 m shuttle run – 1.64 s ($t=2.441$), the sit-up test in 10 s – 1.82 times ($t=3.566$), and the special agility test – 1.04 times ($t=2.144$).

It should be noted that the analysis of the dynamics of the studied indicators revealed a pronounced advantage of the athletes in the experimental group in terms of the rate of increase in special physical qualities compared to the control group (Figure 1).

Table 1. Initial parameters of special physical fitness of volleyball players (coordination and speed-strength characteristics at the stage of the ascertaining pedagogical experiment)

Control and pedagogical tests	Groups (x±m)		t	p
	Experimental	Control		
Standing long jump with two-foot take-off, cm	199,2±2,17	199,6±2,41	0,051	>0,05
Vertical jump with two-foot take-off, cm	47,7±0,64	47,8±0,94	0,041	>0,05
Medicine ball throw, m	14,35±0,33	14,86±0,33	0,426	>0,05
92 m shuttle run, s	27,11±0,49	27,31±0,36	0,114	>0,05
Sit-ups from supine position in 10 seconds, number of repetitions	6,12±0,25	6,24±0,27	0,132	>0,05
Special agility assessment, number of repetitions	3,12±0,29	3,24±0,30	0,116	>0,05

Table 2. Dynamics of coordination and speed-strength abilities indicators in volleyball players during the formative pedagogical experiment

Control and pedagogical tests	Groups (X±m)						t/p
	Control			Experimental			
	Before the experiment	After the experiment	t/p	Before the experiment	After the experiment	t/p	
Standing long jump with two-foot take-off, cm	199,6±2,41	205,2±3,34	1,357/ >0,05	199,2±2,17	218,6±1,99	2,500/ <0,05	3,441/ <0,05
Vertical jump with two-foot take-off, cm	47,8±0,94	49,1±0,84	1,028/ >0,05	47,8±0,64	52,9±0,61	2,207/ <0,05	3,656/ <0,05
Medicine ball throw, m	14,86±0,33	15,78±0,33	1,961/ >0,05	14,35±0,33	16,83±0,32	2,077/ <0,05	2,277/ <0,05
92 m shuttle run, s	27,31±0,36	26,89±0,48	0,696/ >0,05	27,11±0,49	25,25±0,47	1,049/ >0,05	2,441/ <0,05
Sit-ups from supine position in 10 seconds, number of repetitions	6,24±0,27	6,39±0,32	0,357/ >0,05	6,12±0,25	8,21±0,40	2,187/ <0,05	3,566/ <0,05
Special agility assessment, number of repetitions	3,24±0,30	3,48±0,39	0,116/ >0,05	3,12±0,29	4,52±0,29	1,359/ >0,05	2,144/ <0,05

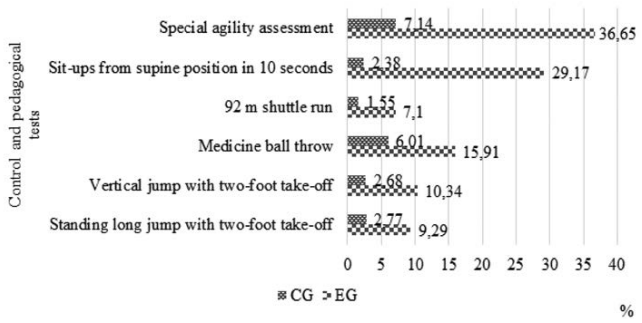

Figure 1. Indicators of growth rates in special physical fitness among young women in experimental groups (%)

It has been established that the growth rates of the experimental group are higher than those of the control group in the following test exercises: assessment of special agility by 29.51%, sit-ups from supine position in 10 seconds by 26.79%, throwing a medicine ball by 9.90%, vertical jump – 7.65%, standing long jump – 6.52%, and 92 m shuttle run – 5.55%.

Conclusions. The results of the formative pedagogical experiment revealed statistically significant positive dynamics and higher growth rates in the indicators of special physical fitness of 16-17-year-old volleyball players in the experimental group, which manifested itself in the improvement of the following parameters: speed and strength (increased results in jumping, throwing exercises and trunk lifts); motor coordination (decreased time to complete the shuttle run control pedagogical exercise, improved results in the special agility test).

Thus, the effectiveness of volleyball training methods with elements of functional training for young women aged 16-17 has been experimentally proven, as confirmed by the results of the study.

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The influence of the ovarian-menstrual cycle phases on the psychological functioning of female athletes

UDC 796.051.2

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Received by the editorial office on 05.08.2025

Abstract

Objective of the study is to identify the dynamics of subjective assessment of the psychofunctional state of female athletes of various specialisations throughout the ovarian-menstrual cycle.

Methods and structure of the study. The WAM questionnaire (well-being, activity, mood) was used to record changes in the psychofunctional state of the athletes examined. To determine the psychofunctional state of the athletes examined at different phases of the ovarian-menstrual cycle (OMC), the questionnaire test for differential self-assessment of the functional state WAM (well-being, activity, mood), which allows for a rapid assessment of a person's condition during periods of mental and physical stress [2]. An assessment of situational (reactive) anxiety [5] was also carried out as a condition characterised by subjectively experienced emotions: tension, restlessness, concern, nervousness, etc. The experiment involved female athletes aged 15-17 who specialise in sprinting and ice hockey.

Results and conclusions. The article presents the dynamics of subjective assessment of the psychofunctional state throughout the ovarian-menstrual cycle (OMC) in female athletes. It is shown that the psychofunctional state of female athletes changes in accordance with the phases of their individual specific biological cycle, and taking this into account when designing a training programme can increase its effectiveness without excessively increasing the volume and intensity of the training activities used.

Keywords: *ice hockey, sprinting, ovarian-menstrual cycle, psychofunctional state, well-being, activity, mood.*

Introduction. Specialists in the field of sports training theory have accumulated considerable theoretical and experimental experience in solving the problem of training women in various sports [1, 3, 7, 8]. However, some aspects of the theoretical justification for the structure and content of micro- and mesocycles in the training process for female athletes require a more careful approach. The latter is related to the need to coordinate the individual manifestations of performance and motor qualities, as well as the mental and functional state of the female athlete's body with the cyclical nature of her reproductive system.

A number of researchers note that excessive training effects are fraught with overtraining in women to a much greater extent than in men [3, 7, 8]. This fact objectifies the need to prevent overtraining by standardising loads that are adequate for the operational state of the female body, and the knowledge and use in practical activities of coaches of information about the peculiarities of biorhythmological patterns of the functioning of the body of a particular athlete is of significant importance not only for improving her athletic performance, but also for maintaining her health.

Objective of the study is to identify the dynamics of subjective assessment of the psychofunctional state of female athletes of various specialisations throughout the ovarian-menstrual cycle.

Methods and structure of the study. To determine the psychofunctional state of the athletes examined in different phases of the OMC, a test question-

naire for differential self-assessment of the functional state of WAM (well-being, activity, mood) was used. It is generally accepted that these three categories provide a sufficiently objective characterisation of the functional state of the human body [2]. This method is widely used to assess the mental state and emotional response to stress of athletes of different genders and specialisations, as well as to identify their individual characteristics. Scores of 5.0 and above indicate a high functional state of the individual, 3.0-5.0 indicate an average state, and 3.0 and below indicate a low state [4].

Situational (reactive) anxiety, as a state characterised by subjectively experienced emotions (tension, restlessness, concern, nervousness, etc.), was assessed using the test developed by C.D. Spielberger and Y.L. Khanin [5]. When interpreting the indicators, the following approximate anxiety ratings can be used: 30 points or less – low, 31-44 points – moderate, and 45 points or more – high [4, 5].

The experiment involved female athletes aged 15-17 who specialised in sprinting and ice hockey.

Results of the study and discussion. When characterising the factors that increase the effectiveness of sports activities, the importance of the psychological aspect is noted [5, 6]. At the same time, knowledge of emotional states, taking into account the biological patterns of the female body, allows for a scientifically based individual approach to the training process of female athletes.

Of particular interest and importance is the definition of anxiety as a reactive state of a person that arises as an emotional response to a stressful situation. It can vary in intensity and dynamics, be accompanied by activation of the autonomic nervous system, and in athletes indicate mental strain and overtraining [5]. Analysis of test results based on the use of the Spielberger-Hanina Anxiety Scale Hanina shows (Table 1) that the level of situational anxiety is highest in the V (premenstrual) phase and statistically significantly ($p<0.05$) differs from the indicators in the II and IV phases. This state, which is clearly perceived and assessed by athletes as a distinct feeling of anxiety, restlessness and fear, is most pronounced in this phase.

In phase I (menstrual), the mental state is characterised by feelings of dissatisfaction, fatigue, some emotional depression or tension. In general, this is confirmed by studies of female hockey players using the WAM method (Table 2), in which the psychofunctional colouring in the menstrual phase is negative in nature, with a predominance of negative moments.

In the postmenstrual phase, the picture changes significantly, and the athletes subjectively rated their well-being and mood as the best. For most of them, their emotional state is characterised by a feeling of satisfaction, optimism, and a desire for activity.

During the ovulatory phase, the changes are not as pronounced. In this phase, it is difficult to determine the predominant direction of emotional reactions. Here, female athletes may experience diametrically opposed psychofunctional states, depending on many external and internal factors [7]. Thus, in this phase, there is a simultaneous manifestation of fairly high activity and a desire for action on the one hand, and dissatisfaction, fairly high emotional tension and anxiety on the other. In the process of interaction, this state manifests itself in the initiation of conflicts, mood swings and poor health.

The post-vulatory phase is very similar to the postmenstrual phase in terms of the characteristics of the athletes' psychofunctional state. Their state in this phase is characterised by a positive emotional background, some euphoria, a desire for new events and impressions, and an increase in mood and activity.

Table 1. Indicators of situational anxiety in short-distance runners (n=18) at different phases of the OMC (± S)

Points		OMC phase	Significance of differences – t-test Student's				
			OMC phase				
$\bar{X}$	S		I	II	III	IV	V
44,2	5,7	I	X				
28,9	4,4	II	2,24*	X			
38,8	7,2	III	1,39	2,17*	X		
30,2	3,1	IV	2,19*	0,13	1,96	X	
46,3	4,6	V	0,36	2,39*	1,83	2,29*	X

*Notes: 1) * – differences are statistically significant ($p<0.05$); 2) OMC phases: I – menstrual; II – postmenstrual; III – ovulatory; IV – postovulatory; V – premenstrual.*

Table 2. Indicators of the emotional state of female hockey players (n=23) according to the SAN questionnaire at different phases of the OMC (points, ± S)

Indicators	OMC phases				
	I	II	III	IV	V
Well-being	2,91±0,14	5,38±0,24*	4,77±0,31	5,26±0,39	3,16±0,35*
Activity	2,82±0,32	5,31±0,18*	5,01±0,21	5,36±0,58	2,92±0,42*
Mood	3,14±0,29	5,96±0,42*	4,83±0,52	5,88±0,26*	2,87±0,53*

*Notes: 1) * – differences are statistically significant between adjacent phases (p<0.05); 2) OMC phases: I – menstrual; II – postmenstrual; III – ovulatory; IV – postovulatory; V – premenstrual.*

Based on the analysis of the data obtained, it can be concluded that the most pronounced changes in the psychofunctional state of athletes, manifested in an increase in their anxiety level, a decrease in activity and well-being, and a deterioration in mood, are observed in the premenstrual and menstrual phases of the OMC, the composition of sports training in which requires special attention.

Thus, the coach is faced with the task of constantly adjusting the training loads of a particular athlete in terms of focus and volume, guided by the individual characteristics of her performance and psychofunctional state in different phases of the body's biorhythms.

Conclusions. The data from the study indicate that there are variations in the psychofunctional status of female athletes throughout the OMC. In turn, synchronising the training structure and the phases of the athletes' ovarian-menstrual cycle will not only make it possible to increase their level of preparedness without increasing the volume and intensity of the training loads applied, but will also, to a large extent, allow them to maintain their psycho-emotional state and reproductive health.

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Visceral protein pool in highly skilled kayakers and canoeists

UDC 797.122

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Received by the editorial office on 20.07.2025

Abstract

Objective of the study is to assess the adequacy of delayed post-exercise recovery of total protein and albumin content in venous blood as criteria for visceral protein pool in highly skilled kayakers and canoeists.

Methods and structure of the study. Summary of data from literary sources substantiating the particular importance of athletes consuming the necessary amount of protein. Monitoring of haematocrit, total protein, albumin and haemoglobin concentration in venous blood in highly skilled kayakers and canoeists. 79 male athletes aged 18 to 37 were examined (20 honoured masters of sport, 23 international class masters of sport of Russia, 36 masters of sport; 40 people were examined repeatedly). Venous blood was collected in the morning, 40 hours after the end of the last training session. Blood analysis was performed at the Regional Clinical Hospital No. 1 named after Professor S. V. Ochapovsky (Krasnodar).

Results and conclusions. All analysed indicators show significant differences at haematocrit values above and below 47%, which corresponds to the 75th centile of this parameter. The interval of mean values of total protein content in the range ±1 σ is 69.62±3.86 g/l, i.e. its upper values (73.48 g/l) are significantly lower than the upper values of the reference interval recommended for clinical practice (68-85 g/l). In 38.8% of measurements, the total protein content in athletes was below 69.62 g/l, of which 29.3% were below 65.76 g/l. In addition, four rowers had total protein levels below 69.62 g/l for two years, and two had levels below 65.76 g/l. A certain correlation between total blood protein and haemoglobin concentration was also established.

The results obtained allow us to conclude that highly skilled kayakers and canoeists may experience a marked decrease in the visceral protein pool due to globulin fractions during routine monitoring, which may negatively affect the state of the immune system and blood coagulation system, to a certain extent contribute to a decrease in haemoglobin content and, in general, to the effectiveness of the training process.

Keywords: rowing sports, highly skilled athletes, blood protein composition, total protein.

Introduction. Since the 2000s, sports nutrition experts have emphasised that the previously recommended amounts of protein in sports diets are not justified, as they can interfere with the consumption of the necessary amounts of carbohydrates in the process of meeting energy needs, and significantly increase the functional load on the hepatobiliary and urinary systems [1, 5].

Today, the view on protein content in athletes' diets has changed significantly [8, 11, 12]. The main provisions of the works devoted to this issue can be grouped as follows:

- the interaction between physical activity and nutritional elements, especially with regard to the consumption of protein and essential amino acids, is crucial in managing both the building and breakdown of muscle proteins [9];

- to promote muscle recovery, remodelling, and improved responses related to strength and hypertrophy as a result of exercise, protein intake is necessary before, during, and after training [10].

- the primary goal of protein consumption after intense exercise or competition is recovery and remodelling, involving both skeletal muscle and connective tissue [7].

- combining amino acids with carbohydrates before training can lead to peak muscle protein synthesis, etc.

Works devoted to the correction of pre-anaemic and anaemic conditions in athletes [2, 6] also note the need to increase the protein content in the diet and to use appropriate nutritional support products for this purpose.

Consuming the necessary amount of protein during intense muscular activity is important not only for maintaining its somatic pool. The visceral pool is equally important, one of the main criteria of which is

the total protein content in the blood. A decrease in this content indicates either an insufficient intake of amino acids from food or problems with their absorption, inhibition of protein biosynthesis processes, and their loss in certain pathological conditions [3].

Objective of the study is to assess the adequacy of delayed post-exercise recovery of total protein and albumin content in venous blood as criteria for visceral protein pool in highly skilled kayakers and canoeists.

The specific objectives of the study were as follows:

- to establish the reliability of differences in total protein and albumin content in venous blood at different haematocrit values (this approach is mandatory when analysing all parameters of blood biochemistry);
- if there is statistically significant reliability of their differences in hematocrit intervals above and below the 75th percentile, determine the average values of these parameters (within the standard deviation range of ±1 σ) in a selected group of athletes, after excluding the corresponding 75th percentile and above;
- determine the number of athletes with total protein and albumin levels in venous blood below the lower limit of the reference range recommended in clinical practice;
- analyse the relationship between blood protein composition indicators and haemoglobin content in venous blood in samples corresponding to a haematocrit indicator below the 75th percentile.

Methods and structure of the study. In order to solve the set tasks, data from literary sources justifying the special importance of athletes consuming the necessary amount of protein [4] were summarised, and the results of monitoring haematocrit, total protein content, albumin and haemoglobin concentration in venous blood in highly skilled kayakers and canoeists. 79 male athletes aged 18 to 37 were examined (20 honoured masters of sport, 23 international class masters of sport of Russia, 36 masters of sport; 40 people were examined repeatedly). Venous blood was collected in the morning, 40 hours after the end of the last training session. Blood analysis was performed at the Regional Clinical Hospital No. 1 named after Professor S. V. Ochapovsky (Krasnodar).

Results of the study and discussion. As the data obtained showed, all analysed indicators reveal significant differences at haematocrit values above and below 47%, which corresponds to the 75th centile of this parameter (Table 1).

When analysing the average values of the parameters studied in different haematocrit ranges (Table 1), it was found that in highly skilled kayakers and canoeists with a haematocrit of 47% and below, the total protein content in the ±1 σ range is 69.62±3.86 g/l. That is, its upper values (73.48 g/l) are significantly lower than the upper values of the reference interval recommended for clinical practice (68-85 g/l) [3]. And even at a haematocrit of 47% and above, the average values of total protein content (74.66±4.41 g/l) remain below the recommended values. At the same time, in 38.8% of measurements, the total protein content in athletes was below 69.62 g/l, of which in 29.3% of cases it was below 65.76 g/l. In addition, four rowers had total protein levels below 69.62 g/l for two years, and two had levels below 65.76 g/l.

With regard to albumin concentration, no such differences were found when compared with the reference ranges recommended by clinicians (35-50 g/l and 45-65 g/l according to various sources). In the examined group of athletes, with a haematocrit level below 47%, the albumin content was 56.69±7.12 g/l, and with a haematocrit level of 47% and above, it was 59.95±5.04 g/l.

That is, judging by the data obtained, the athletes' bodies primarily support the synthesis of albumin, which provides 80-90% of the oncotic pressure to maintain the constancy of circulating blood volume by retaining fluid in the vascular bed, as well as performing a number of other functions (transport, protein reserve of the body). As for globulin fractions, there is a tenden-

Table 1. Reliability of differences in the blood parameters studied at haematocrit values above and below 47%

Name of indicators	Haematocrit value of 47% and above		Haematocrit value below 47%		Obtained value t-criterion
	Number of measurements	Average value (M±σ)	Number of measurements	Average value (M±σ)	
Haemoglobin, g/l	37	162,59±6,58	129	147,96±6,97	11,77*
Haematocrit, %	37	48,14±1,38	129	43,23±2,05	16,94*
Albumin, g/l	30	59,95±5,04	81	56,69±7,12	2,69*
Total protein, g/l	35	74,66±4,41	117	69,62±3,86	6,10*

*Note. * – t-test values indicating the significance of differences.*
The significance of differences was determined by the critical value of the t-test corresponding to the smaller number of measurements.
M – mean value, σ – standard deviation.

Table 2. Correlation matrix of blood parameters in the sample below the 75th percentile for haematocrit

Name of indicator	Haemoglobin, g/l	Haematocrit, %	Albumin, g/l	Total protein, g/l
Haemoglobin, g/l	1			
Haematocrit, %	0,93	1		
Albumin, g/l	0,16	0,12	1	
Total protein, g/l	0,31	0,22	0,35	1

Note. With 44 measurements, the critical value of Spearman's correlation coefficient (significance level 0.05) is 0.298.

cy towards hypoglobulinaemia (based on total protein content values), either due to insufficient protein consumption or insufficient protein absorption, as well as maximum possible use to replenish the somatic pool.

The protein deficiency in highly skilled rowers within the visceral pool, as revealed in the present studies, requires special attention, since correlation analysis (even in a sample excluding values corresponding to a haematocrit of 75 centilitre and above) showed a definite relationship with the concentration of haemoglobin in the blood (Table 2).

Back in 1997, G.A. Makarova [2] noted that hyporegenerative forms of iron deficiency anaemia are usually accompanied by protein metabolism disorders. Israeli and Scandinavian authors [6], in turn, explained the occurrence of anaemia in runners at the beginning of the competitive season by the increased rate of red blood cell destruction and emphasised that this can be prevented by eating a high-protein diet. Taking iron supplements does not prevent the development of this type of anaemia. It has been suggested that this type of anaemia develops as a result of the release of a certain chemical (possibly lysolecithin) from the spleen into the bloodstream, which causes haemolysis of a sufficiently large number of circulating red blood cells. The iron released in this process should be bound by the blood plasma protein transferrin, which belongs to the globulin fractions, but when there is a deficiency of this protein, this does not happen, and the iron is excreted from the body.

Conclusions. Highly skilled athletes specialising in kayaking and canoeing often experience a marked decrease in visceral protein pools due to globulin fractions. This can not only negatively affect the immune system and blood coagulation, but also contribute to a decrease in blood haemoglobin levels and, in general, the effectiveness of the training process. With this in mind, it is reasonable to determine the protein composition of blood, including transferrin levels, as part of medical and biological examinations of athletes.

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Adaptive mechanisms of athletes' bodies under extreme conditions

UDC 796.01:57

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Received by the editorial office on 31.05.2025

Abstract

Objective of the study is to provide theoretical and experimental justification for the basic principles of constructing a comprehensive system of special relaxation training aimed at improving the functional state of athletes' bodies, increasing the rate of skeletal muscle relaxation, and improving the effectiveness of the training process.

Methods and structure of the study. The dynamics of hypoxic resistance, the rate of voluntary relaxation (RVR) of skeletal muscles, and the power of the braking-relaxation functional system of urgent adaptation and protection (BRFSP) of the body from extreme influences during long-term adaptation to various adaptogenic factors were studied. All subjects were divided into two groups: group 1 consisted of athletes with initially high BRFSP capacity (experimental), and group 2 consisted of athletes with initially low BRFSP capacity (control). The purpose of this grouping was to determine the influence of the initial BRFSP power on the nature of long-term adaptation of the parameters under consideration under the influence of various adaptogenic factors.

Results and conclusions. An increase in the activity of the central nervous system's braking systems and muscle RVR, as an urgent adaptive response to intense physical exertion, occurs when BRFSP is activated by extreme influences. The dependence of muscle character and RVR on the functional state of the central nervous system has been demonstrated. The functional state of the central nervous system also largely determines the power of BRFSP. The results of the studies provide a basis for the methods and principles of special relaxation training aimed at increasing the effectiveness of the training process.

Keywords: *central nervous system, training process, relaxation, physical performance.*

Introduction. The problem of ensuring effective training of athletes in extreme conditions and creating functional prerequisites for maintaining health is becoming increasingly relevant [1, 5, 6]. One way to solve this problem is to use effective modern and physiologically sound technologies while simultaneously employing a rational system of comprehensive diagnosis and correction of functional status. This allows for expanding the range of compensatory capabilities of the body. Ensuring optimal adaptation to muscle loads is one of the conditions for maintaining health and improving professional skills [1, 2, 4, 7]. Muscle relaxation, in particular, the rate of voluntary relaxation (RVR) of skeletal muscles, is no less important a quality characterising the functional state and functional capabilities of the body than the contractile characteristics of muscles. In studies devoted to the study of the rate of relaxation of skeletal muscles [2, 3, 5, 6], the beneficial effect of special exercises that improve the RVR of skeletal muscles on the central nervous system, the formation of rational types of blood circulation, coordination of movements, speed, endurance, technical skills, growth of special physical working capacity (SPWC) and sports results has been shown.

Objective of the study is to provide theoretical and experimental justification for the basic principles of constructing a comprehensive system of special relaxation training aimed at improving the functional state of athletes' bodies, increasing the rate of skeletal muscle relaxation, and improving the effectiveness of the training process.

Methods and structure of the study. The dynamics of hypoxic resistance (HR), skeletal muscle RVR, and the power of the brake-relaxation functional system of rapid adaptation and protection (BRFSP) of the body from extreme influences during long-term adaptation to various adaptogenic factors were studied. All subjects were divided into two groups: group 1 consisted of athletes with initially high BRFSP power (experimental), and group 2 consisted of athletes with

initially low BRFSP power (control). The purpose of this grouping was to determine the influence of the initial BRFSP power on the nature of long-term adaptation of the parameters under consideration under the influence of various adaptogenic factors (SAF). The more BRFSP is activated, the faster and more effective the adaptation process is, leading to an increase in skeletal muscle RVR and the formation of a relaxation type of long-term adaptation (RTLA).

Results of the study and discussion. Analysis of the research results showed that various adaptogenic factors and their combinations lead to different dynamics of HR, RVR of skeletal muscles, and BRFSP power of the body from extreme exposures during long-term adaptation. When reviewing the results of the examinations, it was found that in group 1 of athletes, the greatest increases in RVR were achieved by using a combination of altitude hypoxia, simulated in a general-purpose pressure chamber (7 sessions), and physical training (RVR increase of 30.5% in 10 days), as well as a combination of 10 sessions of biofeedback based on electroencephalograms with physical training (PT) (RVR increase of 11.8% in 30 days). The combination of the same exercises with relaxation exercises had a greater effect (15.0% increase in RVR over 30 days). In group 2, the increases in all parameters were lower. Conventional physical training was significantly less effective in both groups. The combination of SAF with physical training provides a several times greater effect. The results of the studies showed that, regardless of the adaptogenic factors or their combinations used, subjects with high baseline BRFSP (group 1) had higher increases in HR and RVR parameters compared to subjects in the second group (low BRFSP) (Figure 1)

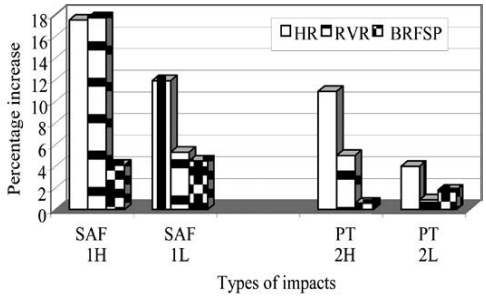

Figure 1. Dynamics of HR, RVR of skeletal muscles and BRFSP power under the influence of adaptogenic factors and their combinations

The combination of SAF with physical training in athletes with high BRFSP power over 23 days resulted in a 17.8% increase in HR ($p<0.001$), a 19.1% increase in muscle RVR ($p<0.001$), and a 4.4% increase in BRFSP power ($p<0.01$). In athletes with low BRFSP power under the same conditions, HR increased by 11.9% ($p<0.01$), muscle RVR by 5.0% ($p<0.05$), and BRFSP power by 3.1% ($p<0.01$). When using training physical loads in athletes with high BRFSP power, after 150 days of training, HR stability increased by 1.0% ($p<0.01$), muscle RVR by 6.9% ($p<0.05$), and BRFSP power by 0.8% (not significant). Athletes with low BRFSP power also showed positive (not significant) dynamics in the parameters under consideration, but the increases were significantly smaller than in the first group. Considering that SAF exposure lasted only 23 days, while physical training lasted 150 days, the differences in the effectiveness of these exposures were even greater when calculated on a per-day basis. After combined exposure to physical exercise and other SAF, compared to conventional physical training, the daily increase in HR, RVR and BRFSP parameters was higher in athletes with high BRFSP power. The results show that the use of combined SAF exposure is many times more effective than conventional physical exercise. The effectiveness of any exposure is several times higher in athletes with higher BRFSP power.

In the next series of studies, an experimental assessment of the effectiveness of the relaxation training system we developed in the training process was carried out. The footballers of the experimental team, along with conventional physical training, used a relaxation training system that included the following activities: a weekly cycle of barochamber training, regular use of relaxation exercises and breath-holding exercises, and use of a sauna once a week.

The control team trained according to the standard programme and did not use any additional training methods. Polymyographic, cardiological, biochemical, psychophysiological and ergometric research methods were used to study the patterns of performance dynamics and the functional state of various body systems during long-term adaptation.

The first examination was conducted at the beginning and the last at the end of the competitive season. The direction of changes in the teams was different. In the experimental team, by the end of the season, compared to the beginning, there was a significant ($p<0.001$) increase in muscle RVR and a significant ($p<0.01$) decrease in the adaptation type classification index (ATCI), indicating a shift towards RTLA. In the control team, on the contrary, RVR decreased significantly ($p<0.01$), and the ATCI value increased significantly ($p<0.05$), indicating the formation of a hypertrophic type of adaptation.

The dynamics of all parameters considered were different. In the experimental group, the dynamics were positive, while in the control group, they were negative. In the experimental team, significant ($p<0.05$ - $p<0.001$) increases were found in 16 out of 20 parameters. Muscle contraction characteristics increased insignificantly, but muscle RVR increased by 17.6% ($p<0.001$).

As a result, ATCI significantly decreased (by 15.2%; $p<0.01$), indicating the formation of RTLA. Ergometric characteristics of physical working capacity increased: starting by 16.5% ($p<0.01$), maximum by 23.7% ($p<0.001$), finish by 6.8% ($p<0.05$), average by 8.3% ($p<0.001$), and pedalling speed on the bicycle ergometer by 12.1% ($p<0.01$). All cardiological, biochemical, and neurophysiological parameters characterising energy efficiency and the speed of recovery processes improved significantly. The efficiency of cardiac activity increased by 25.0% ($p < 0.001$), the efficiency of glycolysis by 26.4% ($p < 0.05$), creatine phosphate by 4.5% ($p < 0.05$) and phosphorus by 25.0% ($p < 0.05$). The pulse recovery rate increased by 8.7% ($p<0.001$). Resistance to fatigue improved by 13.6% ($p<0.01$), recovery rate by 7.2% ($p<0.01$) and completeness of recovery by 12.3% ($p<0.01$) of muscle contractile properties. The overall efficiency coefficient (OEC) of the body's systems also increased significantly (by 16.9%; $p<0.001$). Positive dynamics were also revealed by psychophysiological studies.

A different picture was observed in the control team. The footballers in this team showed negative dynamics in almost all parameters, and a statistically significant deterioration ($p<0.05$ - $p<0.001$) was found in 13 of them. The integral indicator – OEC of body systems – decreased by 11.2% ($p<0.001$). The deterioration in SPWC and the functional state of the control team's footballers by the end of the season is a natural phenomenon, explained by chronic fatigue that accumulates during an intense competitive period. The improvement in all parameters studied by the end of the season in the experimental team is unusual. This proves the effectiveness of the developed relaxation training system, which also increases the effectiveness of the entire training process. An improvement in SPWC was also found in the veteran team players who used a similar training system. The number of injuries was minimised. This confirms the correctness of the direction we have chosen to improve the special training of athletes.

Conclusions. An increase in the activity of the CNS braking systems and muscle RVR, as an urgent adaptive response to intense physical exertion, occurs when BRFSP is activated by extreme influences. The dependence of muscle character and RVR on the functional state of the CNS has been demonstrated. The functional state of the CNS also largely determines the power of BRFSP.

The results of the studies make it possible to substantiate the methods and principles of developing special relaxation training aimed at increasing the effectiveness of the training process. There are known methods for increasing the SPWC of athletes based on increasing the volume of physical activity. They are effective for achieving the main goal, but do not ensure the preservation of athletes' health. With an increase in the volume and intensity of loads, sports injuries and morbidity increase.

There are known ways to improve health, where moderate physical activity plays a healing role. This does not contribute to the progress of sports results. It is necessary to find new ways to solve these complex and almost incompatible problems – achieving the highest levels of SPWC and preserving the health of athletes, which we have combined into one problem – increasing the effectiveness of motor activity.

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Urgent audiovisual relaxation training as a tool for managing stress reactions in first-year students

UDC 159.9.072

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Received by the editorial office on 12.07.2025

Abstract

Objective of the study is to theoretically substantiate and experimentally verify methods of self-regulation among 1st-year students.

Methods and structure of the study. 1st-year psychology students (n=32) participated in the scientific work during the winter session. Using the BOSLAB hardware and software complex, dynamic changes in key physiological indicators were recorded: skin galvanic response (SGR), photoplethysmogram (PPG), respiratory cycle duration, and exhalation duration.

Results and conclusions. The phased nature of the adaptation processes was identified: an initial decrease in SGR (from 7.31±0.51 to 6.61±0.48 μS) followed by stabilisation (7.02±0.46 μS), wave-like dynamics of PPG (peak 307.31±29.75 u.e. in the first minute) and a significant increase in the duration of exhalation (from 1.48±0.07 to 1.89±0.16 s). The data obtained indicate a pronounced influence of psychophysiological reactions on vegetative regulation, especially on respiratory function, which confirms its effectiveness as a tool for managing stress reactions in an educational environment. The results of the study are of practical importance for the development of psychological support programmes for students during the period of adaptation to the academic workload.

Keywords: *first-year students, physiological indicators, relaxation training.*

Introduction. According to WCIOM data for 2024, the index of demand for psychological support among the Russian population reached its highest level in the last six years, showing particularly sharp growth after 2022, with young people demonstrating the highest demand for support [4]. This alarming trend is confirmed by official medical statistics: according to Rosstat, the number of registered cases of mental and behavioural disorders among adolescents aged 17-19 increased from 33,336 in 2019 to 35,536 in 2023 [8].

The observed increase in the need for psychological help and the increase in diagnosed disorders indicate a worsening of the problem of mental health among young people. Of particular concern is the fact that these indicators continue to rise even as the availability of psychological services expands. Although more than half of young people in the country enrol in higher education institutions, these institutions remain an underutilised resource for the prevention of mental illness, despite their unique potential in this area. This problem is particularly relevant given that the period of adaptation to the university environment is often associated with increased stress, which can trigger the development of mental disorders in vulnerable students [1].

The intensification of the learning process, constant updating of educational programmes and increasing cognitive loads create conditions for the development of chronic nervous and emotional tension. Psychology students are a particularly at-risk group, as their future professional activity is inherently stressful, requiring special attention to the development of their nervous and mental stability already at the stage of professional training [1].

The greatest vulnerability is observed among 1st-year students, whose adaptive mechanisms are in the process of active formation. The period of professional self-determination coincides with a radical restruc-

turing of the entire system of social relations, which creates a critical load on the emotional and volitional sphere of the personality [6, 7]. Success in overcoming this transitional stage largely determines not only current academic performance, but also further professional development, which highlights the need to develop targeted psychological support measures [3].

International research experience offers various approaches to student self-regulation, including mindfulness programmes, breathing techniques, and movement therapy methods [5, 9, 10]. The Russian scientific school has made a significant contribution to the study of this problem by developing a number of effective methods for regulating the psycho-emotional state in conditions of educational stress [2]. However, an analysis of existing studies reveals a significant imbalance between fundamental works on the general theory of stress and applied developments focused on specific educational contexts.

The current situation reflects a methodological contradiction between the objective need for effective means of preventing academic stress and the insufficient development of scientifically based technologies for psychological support of 1st-year students. In this regard, the aim of our study is to provide a theoretical justification and experimental verification of one of the methods for reducing academic stress in 1st-year students.

Objective of the study is to theoretically substantiate and experimentally verify methods of self-regulation among 1st-year students.

Methods and structure of the study. A pilot experiment was conducted to assess the impact of simulating a conscious walk through familiar places on stress indicators among psychology students during the exam period. The total number of respondents was 32 girls aged 17 to 19. All participants were in health groups 1 and 2 and had no chronic diseases at the time of the study.

The study was conducted with the consent of the subjects, in compliance with the rules of physiological ethics (Declaration of Helsinki and European Community directives, 8/609 EC), in an isolated room. The experiment scenario was as follows: the subjects walked on a stepper in front of a 102 cm diagonal TV screen showing a video clip filmed according to the principles of the mindfulness approach in a well-known location (in this case, the footage was shot on Mikhailovskaya Embankment in Novosibirsk). The video was 2 minutes long. Physiological indicators (skin galvanic response (SGR); circulatory system function (photoplethysmogram, PPG); respiratory cycle duration and exhalation duration) were recorded using the BOSLAB APC (manufactured by KOMSIB LLC, Novosibirsk).

Psychophysiological indicators were recorded at baseline and every 30 seconds after the presentation of psychophysiological reactions. Before the start of the experiment, all subjects were given the following instruction: 'Imagine that you are walking down the street, looking closely at the screen and walking at a pace that is comfortable for you.'

Results of the study and discussion. An experimental study revealed complex dynamics of psychophysiological indicators when applying the psychophysical regulation technique. The most significant changes were recorded in the parameters of the skin-galvanic reaction, demonstrating the characteristic phasing of the adaptation process. The initial decrease in electrodermal activity from 7.31±0.51 to 6.61±0.48 μS in the initial phase of the procedure, followed by subsequent activation to 7.18±0.43 μS and final stabilisation at 7.02±0.46 μS, corresponds to theoretical models of vegetative regulation under stress. Such nonlinear dynamics may reflect the sequential activation of the sympathetic and parasympathetic divisions of the nervous system in the process of psychophysiological self-regulation.

Analysis of peripheral blood circulation indicators revealed pronounced wave-like dynamics of the photoplethysmogram. From the initial level of 279.79±27.92 u.e., the parameters reached a maximum of 307.31±29.75 u.e. in the first minute, then decreased to 275.67±30.85 u.e. with a subsequent tendency to normalise (300.31±32.92 u.e.). Such fluctuations in vascular tone are consistent with modern ideas about vasomotor regulation during psycho-emotional stress and confirm the effectiveness of the technique used in modulating cardiovascular responses.

Of particular interest are the recorded changes in respiratory function. The duration of the respiratory cycle showed a significant increase from 3.61±0.56 to 4.72±1.02 s in the initial period, followed by stabilisation at 3.12±0.20 s. At the same time, a progressive lengthening of the exhalation phase was observed, from an initial 1.48±0.07 s to 1.89±0.16 s, followed by normalisation. These data convincingly demonstrate the pronounced effect of the technique on breathing patterns, which is particularly significant in terms of the mechanisms of vegetative regulation, given the

close relationship between the respiratory and cardiovascular systems.

Conclusions. The results obtained allow us to conclude that the psychophysical regulation technique used is highly effective in controlling vegetative functions. The observed phasing of changes in physiological parameters corresponds to classical ideas about the dynamics of adaptation processes. The most significant effects were recorded in relation to respiratory function, which confirms the key role of breathing techniques in the mechanisms of psychophysiological self-regulation. These data are important for the development of psychological support programmes for students during the period of adaptation to the academic workload.

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The role of protein in the growth and development of muscle mass in strength athletes

UDC 613.2:612.76

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Received by the editorial office on 12.07.2025

Abstract

Objective of the study is to systematise and analyse current scientific data on the role of protein in skeletal muscle adaptations during regular strength training.

Methods and structure of the study. A comparative analysis was conducted of a group of arm wrestlers (n=20, males aged 18-25 years, with at least 2 years of training experience), who were divided into two subgroups depending on their daily protein intake: control group (up to 1.4 g/kg of body weight) and experimental group (2.0-2.2 g/kg of body weight). Over a period of 10 weeks, changes in muscle mass (using bioimpedance analysis) and increases in competitive strength (based on the results of specific dynamometric tests on the wrist and elbow flexor) were monitored.

Results and conclusions. The experimental group showed an average increase in lean muscle mass of 1.4 kg compared to 0.6 kg in the control group, as well as an increase in competitive strength of 13.2% compared to 6.7%, respectively. The study also analyses the effect of protein intake timing (before, after and during training), it's even distribution throughout the day and the use of protein supplements in the athletes' diet. The risks of excessive protein consumption, including the potential strain on the kidneys and digestive system, and the importance of an individual approach to an athlete's diet are discussed separately. The article is intended for specialists in the field of sports medicine, nutritionists and coaches working with strength athletes.

Keywords: *muscle mass, high-protein diet, strength training, mass development, amino acids.*

Introduction. Building muscle mass is one of the key criteria for successful training of athletes in strength disciplines, including bodybuilding, powerlifting, weightlifting, arm wrestling, and CrossFit. In addition to a properly structured training programme, an adequate supply of protein – the main building material for skeletal muscles – is a decisive factor [4,8]. Proteins are necessary not only for muscle hypertrophy, but also for recovery after intense exercise [11].

Numerous studies in recent years have shown a direct relationship between the quantity and quality of protein consumed and the results of strength training [8]. However, questions about the optimal amount, sources, timing of intake, and combination of protein with other macro- and micronutrients are still debated in the scientific community [2, 9]. An equally important issue is the bioavailability of proteins of different origins and their role in regulating anabolic processes [1, 6, 13].

Objective of the study is to systematise and analyse current scientific data on the role of protein in skeletal muscle adaptations during regular strength training.

Methods and structure of the study. This work is based on an analysis of domestic and foreign studies published in peer-reviewed scientific journals [1-2, 5-8, 12, 13]. The methodological basis is the principle of a systematic approach with an emphasis on the following parameters:

- average daily protein intake (per 1 kg of body weight),
- temporary protein intake schedules,
- protein origin (animal, plant),
- the role of BCAAs in muscle tissue anabolism.

The analysis includes data from clinical studies, meta-analyses, and recommendations from the International Society of Sports Nutrition (ISSN) [8, 12].

Twenty male athletes aged 18 to 25 who had been practising arm wrestling for at least two years at the physical education and health complex of the Russian State Agrarian University - Moscow Timiryazev Agri-

cultural Academy took part in the practical part of the study. The frequency and amount of daily protein and biologically active food supplement consumption were studied using a specially designed questionnaire. The participants were divided into two groups:

• control group: protein intake up to 1.4 g/kg of body weight per day;

• experimental group: protein intake in the range of 2.0–2.2 g/kg of body weight per day.

The study was conducted over a period of 10 weeks. Measurements included:

• changes in muscle mass using bioimpedance analysis;

• gains in competitive strength assessed using dynamometric tests on the wrist and elbow flexor;

• subjective assessments of recovery and muscle catabolism levels.

Results of the study and discussion. Current recommendations for strength athletes range from 1.6 to 2.2 g of protein per kg of body weight per day. Higher doses may be justified during periods of weight loss or high-intensity training. It has been established that an even distribution of protein across meals throughout the day (20-40 g per serving) contributes to more effective muscle protein synthesis [9].

The practical part of the study allows us to draw important conclusions that are relevant for coaches, athletes, and sports doctors. The data obtained confirm that increasing protein consumption to 2.0-2.2 g/kg of body weight in the context of regular strength training: promotes a more pronounced increase in lean muscle mass (on average +1.4 kg versus +0.6 kg in the control group over 10 weeks), improves competitive strength indicators (+13.2% versus 6.7%) and has a positive effect on the feeling of recovery and reduction of signs of catabolism (according to subjective surveys).

Studies show that animal proteins (whey, casein, meat, eggs) have a higher completeness index (in terms of the content of all essential amino acids) and are absorbed faster [1, 6, 13]. However, with a competent combination of plant sources (soy, pea, rice protein), a similar anabolic effect can be achieved [13]. Experiments on strength athletes have not revealed significant differences in muscle mass growth when consuming equal doses of animal and plant protein. This opens up new opportunities for athletes who follow a vegetarian or vegan diet [10, 13].

Leucine, one of the components of BCAA, triggers the mTOR signalling pathway, which stimulates muscle protein synthesis [6,11]. Taking BCAAs, especially during the peri- and post-workout period, helps speed up recovery and reduce catabolic processes. A study has shown that BCAA supplements increase lean muscle mass when taken over a long period of time [6].

The question of the most effective time to consume protein remains a subject of debate. Some studies point to the benefits of consuming protein immediately before or after training to maximise muscle protein synthesis [9]. However, other studies emphasise the importance of evenly distributing protein consumption throughout the day [12]. Overall, total daily protein intake plays a more important role than the exact time of intake.

Potential risks

Excessive protein consumption without sufficient physical activity can put strain on the kidneys, especially if there is a predisposition. In healthy athletes, a high-protein diet of up to 3 g/kg/day is safe [12].

Conclusions. The optimal protein intake for strength athletes is 1.6-2.2 g/kg of body weight per day. Both animal and plant proteins can contribute to muscle growth, provided they contain adequate amounts of amino acids. Leucine and other BCAAs play a key role in activating muscle synthesis, especially during peri- and post-workout periods. It is important to consider not only the amount but also the timing of protein consumption – preferably evenly distributed throughout the day. When physiological norms are observed, a high-protein diet is a safe and effective strategy in the training of strength athletes.

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Changes in the functional capabilities of the cardiovascular system of medical students during the academic year

UDC 796

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Received by the editorial office on 26.07.2025

Abstract

Objective of the study is to analyse changes in the functional capabilities of the cardiovascular system of medical students during the academic year.

Methods and structure of the study. The study was conducted at the Department of Physical Education of Surgut State University. To assess the functional capabilities of the cardiovascular system of students, the following were used: the Kerdov vegetative index (VI), the Robinson index (RI), the endurance coefficient (EC), and the cardiovascular system adaptation potential index. First-year medical students (103 in total, including 69 women and 34 men) took part in the testing.

Results and conclusions. An analysis of changes in the functional capabilities of the cardiovascular system of medical students during the academic year revealed a positive trend in indicators. Young men showed economisation of cardiac activity, while young women showed stabilisation of regulatory processes. The results obtained reflect the formation of adaptive mechanisms in the bodies of first-year students.

Keywords: *psychophysical readiness, medical students, cardiovascular system, autonomic nervous system.*

Introduction. The modern system of higher education in the field of medicine places high demands on the level of psychophysical preparedness of future specialists. The professional activity of a doctor is associated with a high level of responsibility, as well as the need to maintain a high level of performance under conditions of mental and physical stress.

In this regard, particular importance is attached to the training of future medical workers in universities, in particular the organisation of physical education for medical students, which should be focused not only on the development of physical and mental qualities, but also on the formation of adaptive and regulatory mechanisms of the body [2].

One of the informative criteria for assessing the effectiveness of physical education and the formation of psychophysical preparedness is the state of the cardiovascular and vegetative systems, which reflect the degree of adaptation of the body to both educational and professional activities. It is well known that optimal functioning of the autonomic nervous system provides the conditions for maintaining homeostasis and contributes to increased stress resistance and improved cognitive performance, which is particularly important for students in medical fields of study.

Objective of the study is to analyse changes in the functional capabilities of the cardiovascular system of medical students during the academic year.

Methods and structure of the study. The study was conducted at the Department of Physical Education of Surgut State University. To assess the functional capabilities of the cardiovascular system of students, the following were used: the Kerdo vegetative index (VI), the Robinson index (RI), the endurance coefficient (EC), and the cardiovascular system adaptation potential index. First-year medical students (a total of 103 people, including 69 women and 34 men) studying medicine took part in the testing.

Results of the study and discussion. Analysing the results of the cardiovascular system indicators of students (Table 1), it should be noted that the heart rate at the beginning of the academic year, both among young men and women, is above normal (more than 80 beats per minute). At the end of the year, there

Table 1. Cardiovascular system indicators of students during the academic year (M±m)

Indicators	Young men		Young women	
	Pre-control	Post-control	Pre-control	Post-control
Heart rate (bpm)	85,14±1,54	79,23±1,50	84,56±1,28	80,95±1,06
Systolic blood pressure (SBP) (mm Hg)	128,17±2,25	124,38±1,46	116,52±1,15	111,66±1,10
Diastolic blood pressure (DBP) (mm Hg)	84,20±1,50	79,97±1,31	76,94±0,96	73,56±1,02
Pulse pressure (mm Hg)	43,97±2,22	44,41±2,11	39,57±0,93	38,10±0,87

is a positive trend towards a decrease in heart rate to the normal range (60-80 beats per minute).

The blood pressure readings of students at the beginning of the academic year were within normal limits, with no deviations towards hypertension or hypotension. By the end of the academic year, a decrease in systolic and diastolic blood pressure values was recorded. After the decrease, SBP and DBP remained within normal limits, which can be considered one of the signs of adaptation to academic stress. Pulse pressure is also within physiological normal limits, with a decrease observed by the end of the academic year, which may indicate economisation of the heart and increased efficiency of haemodynamic regulation [3-5].

Based on the obtained parameters of the cardiovascular system, Robinson's indices, endurance coefficient, Kerdov vegetative index, and cardiovascular system adaptation potential index were calculated. The results of the study are presented in Table 2, Figures 3-4.

At the beginning of the academic year, the average group VI index in young men (0.27±2.16) corresponded to a state of vegetative equilibrium. In young women, the VI was significantly higher (7.88±1.58), which may indicate the predominance of sympathetic nervous system activity. By the end of the academic year, a decrease in VI values (-2.15±2.63) was observed in young men, indicating a shift towards the predominance of parasympathetic innervation tone. Meanwhile, young women showed a slight increase to 8.30±1.56, which may be associated with emotional sensitivity and high stress levels in the educational process.

According to RI, it should be noted that by the end of the year, the results among young men and women show a clear downward trend of more than 8 units. The decrease in this indicator in both groups indicates an increase in the efficiency of cardiac activity. In particular, this may indicate economical and effective contractile activity of the myocardium, which increases the capabilities of the cardiovascular system.

The endurance coefficient was determined using the Kvas formula. As the studies showed, by the end of the year, a pronounced decrease in the average group indicator was observed only among young men (19.08±0.91), while among young women, the indicators remained practically at the same level (21.94±0.55). The decrease in EC in young men may be associated with an increase in functional reserves and improved resistance to physical and psycho-emotional stress, which can be considered a sign of adaptive restructuring of the cardiovascular system.

Table 2. Indicators of the Kerdo vegetative index, Robinson index, endurance coefficient and adaptive potential of students during the academic year (M±m)

Indicators	Young men		Young women	
	Pre-control	Post-control	Pre-control	Post-control
Kerdo vegetative index (VI)	0,27±2,16	-2,15±2,63	7,88±1,58	8,30±1,56
Robinson index (RI)	109,27±3,08	98,74±8,65	98,71±1,93	90,66±1,68
Endurance coefficient (EC)	22,10±2,16	19,08±0,91	22,19±0,63	21,94±0,55
Cardiovascular system adaptation potential index	2,46±0,05	2,31±0,05	2,21±0,24	2,09±0,03

According to scientists, health can be viewed as the degree of severity of adaptive reactions caused by the development of the body's functional reserves. The indicators of the adaptive potential of the cardiovascular system obtained using the method developed by R.M. Baevsky at the beginning of the academic year were within the range of 'satisfactory adaptation' (up to 2.59). At the end of the year, the values decreased slightly to 2.21±0.24 in young men and 2.09±0.03 in young women. This dynamic indicates an increase in the degree of adaptation of students and an improvement in the circulatory system. By the end of the year, the results in both groups had improved, which may indicate a balanced physiological response and no signs of overstrain of regulatory mechanisms [1].

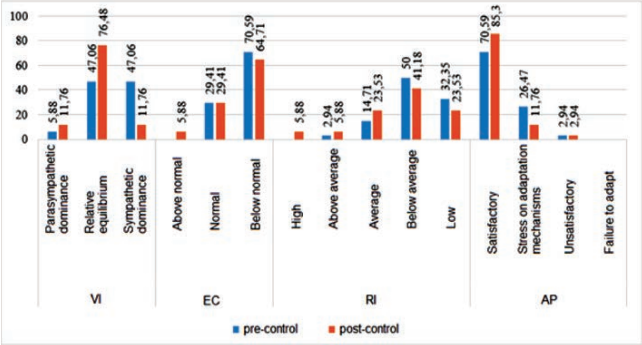

Figure 1. Changes in the functional state of the cardiovascular and autonomic nervous systems of young men during the academic year

Figure 1 shows changes in the functional state of the cardiovascular and autonomic nervous systems in young men, revealing a trend towards normalisation and increased adaptive capacity of the body. At the end of the academic year, there is a noticeable increase in the relative balance of autonomic regulation, improvement in the functional state of the cardiovascular system, and a decrease in the tension of compensatory mechanisms.

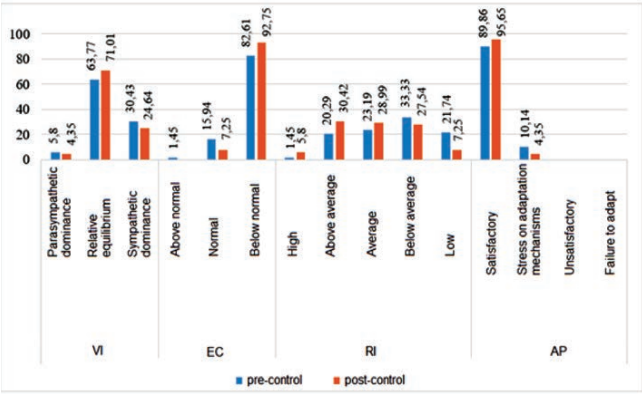

Figure 2. Changes in the functional state of the cardiovascular and autonomic nervous systems of young women during the academic year

The changes in the indicators for female students show positive dynamics, reflecting an improvement in vegetative regulation and an increase in the adaptive capabilities of the female students' bodies. At the end of the academic year, a predominance of female students with a relative balance between the divisions of the vegetative nervous system and a satisfactory level of adaptation was identified.

Conclusions. An assessment of changes in the functional capabilities of the cardiovascular system of medical students during the academic year shows an improvement. Young men show a tendency towards economisation of cardiac activity and increased endurance, while young women show a tendency towards stabilisation of regulatory processes and moderate sympathetic predominance. The results obtained indicate the formation of adaptive mechanisms and an adequate response of the body to prolonged academic stress.

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Determining the digital maturity index for assessing population health

UDC 314.7:614.49:007

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Received by the editorial office on 12.07.2025

Abstract

Objective of the study is to provide a theoretical justification for the digital maturity index of the population in physical health management as an indicator of the demand for digital tools in maintaining a healthy lifestyle.

Methods and structure of the study. A comprehensive approach was applied, including comparative analysis, analysis and synthesis methods, and modelling.

Results and conclusions. The Digital Maturity Index for Managing Physical Health (DMIMPH) is a metric tool that quantifies the degree of integration of digital technologies into the management of human physical health based on the monitoring and assessment of biological parameters. DMIMPH allows assessing the level of digital maturity of the population using modern devices, health monitoring systems, and data exchange technologies. In this article, digital maturity is understood as the level of awareness, efficiency, and interest of a person in using modern technologies and technical devices.

According to the authors, the digitalisation of health is the process of introducing and applying technologies and technical means into the daily life of an individual for the independent analysis, monitoring and control of health and physical condition. The article presents the main components of the human health digitalisation index, its calculation formula and a comparison with traditional health assessment scales, such as SF-36 and the Human Health Index (HHI). It is assumed that a high level of DMIMPH will, over time, contribute to the development of the accessibility and effectiveness of preventive medicine and telemedicine.

Research into the Digital Maturity Index of Population Health Management (DMIMPH) opens up promising avenues for analysing the role of digital tools in modern medicine, as well as for developing new approaches to the digital maturity of patients in the context of telemedicine and preventive medicine.

Keywords: *healthy lifestyle, digitalisation, digital maturity index of the population in physical health management (DMIMPH), digital technologies, public health.*

Introduction. In recent years, digital technologies have been actively introduced into all spheres of society [4]. As is well known, the health of the nation is the most important strategic resource of any country, on which the competitiveness of the workforce, labour productivity, the state of the national economy and the sustainable development of society and the state depend [1]. Physical health requires not only a traditional approach to assessment, but also the introduction of new metrics that take into account the impact of digitalisation. In this regard, it is important to develop tools that allow for a quantitative assessment of the level of use of digital tools for analysing and monitoring human health and to identify the degree of influence of digital technologies on the healthcare system.

Objective of the study is to provide a theoretical justification for the digital maturity index of the population in physical health management as an indicator of the demand for digital tools in maintaining a healthy lifestyle.

Methods and structure of the study. A comprehensive approach was applied, including comparative analysis, analysis and synthesis methods, and modelling.

Results of the study and discussion. Various indices are currently used to assess the level of development of medicine (Figure 1).

However, the intensive development of digital technologies and the availability of information about health status contribute to the emergence of a new scientific and practical task: the development of a quantitative tool for assessing the level of digital matu-

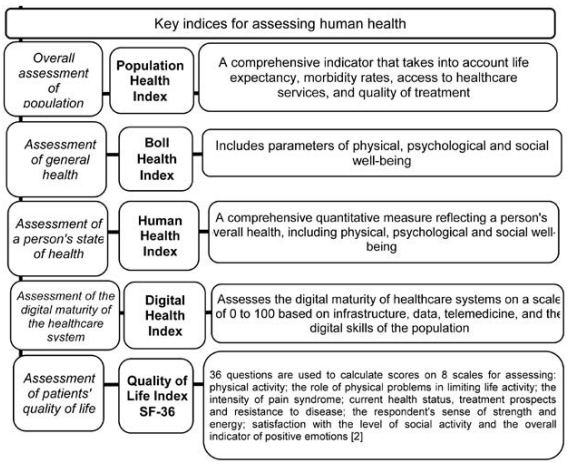

Figure 1. Main indices for assessing human health (Source: compiled by the authors)

rity of the population and monitoring human physical health through interaction with digital tools.

The weighted components of the Digital Maturity Index for Population in Physical Health Management (DMIMPH) will be two groups of factors that influence the level of digital maturity of individuals.

1. Government influence, including the following components: electronic medical records, telemedicine consultations, the EMIAS application[1].

2. Personal initiative involves a number of components: the availability and number of wearable devices (fitness trackers, smart watches, glucometers, heart rate monitors).

The calculation of the Digital Maturity Index for Population in Physical Health Management (DMIMPH) can be represented as a formula that combines all components, taking into account their weight and level of development:

$$DMIMPH = \sum_{i=1}^{N} \left(\frac{V_i \cdot N_i}{100}\right) \quad (1)$$

where Vi – is the weight coefficient of the component (totalling 10),

Ni – is the value on a scale from 0 to 100 for each component,

N – is the number of components characterising the digitisation of health.

Each component has a weighting factor Vi, where the sum of all Vi = 10 (i.e. the maximum total DMIMPH score will be 10). First, it is necessary to determine the weighted value for each component i, then, the results obtained are summed up and the final DMIMPH is determined in the range from 0 to 10. A value from 0 to 10 is a generalised quantitative assessment; the closer the indicator is to 10, the higher the level of digitalisation of human health (Table 1).

*The authors support the view expressed in the report 'A New Digital Tool for Personalised Health Management in the 4P Medicine Model' by D.S. Yankevich, A.V. Martushev-Poklad from the Prof. I.V. Pryanikov Federal Scientific and Clinical Centre for Resuscitation and Rehabilitation, on the inappropriateness of using digital tools and services in complicated cases of age-related diseases[2].

Let us assume that during the survey of one respondent, it was revealed that the person had used three components of modern digital technologies in relation to traditional health management methods during the year, namely 80/20 for the use of wearable devices, 70/30 for telemedicine consultations, and 90/10 for the use of digital medical records (Table 2).

In this case, we obtain the following:

HHDI=(4×80/100)+(3×70/100)+(3×90/100)=3,2+2,1+2,7=8,0

A score of 8.0 indicates a high level of digital maturity in the respondent's health.

Thus, the Digital Maturity Index for Population in Physical Health Management (DMIMPH) shows the level of a person's involvement in using digital technologies to manage and monitor their health.

To determine the difference between the Human Health Index (HHI) and the Digital Maturity Index of the Population in Physical Health Management (DMIMPH), let us consider their key characteristics (Table 3).

The Human Health Index (HHI) is a comprehensive quantitative measure that reflects an individual's over-

[1] emias.info

[2] https://mrik-fmba.ru/images/pages/Nauka/Kongress%202/Vilizij%201/Prezentacii/Ankevic_Novyj%20cifrovoj%20instrument.pdf?ysclid=mcun4awj1s511793128

Table 1. Description of DMIMPH levels

HHDI level	Description	Результат
Low level	Minimal use of digital tools to maintain personal health*	0-3
Medium level	Use of basic technologies, but without a systematic approach	4-6
High level	Active use of digital solutions for self-monitoring and maintaining health	7 – 8
Very high level	Full integration of digital technologies into everyday health care practices	9-10

(Source: compiled by the authors)

Table 2. Example of DMIMPH index assessment (based on one respondent)

Component	Vi (weight)	Ni (rating from 0–100)
Use of wearable devices	4	80
Telemedicine consultations	3	70
Digital medical records	3	90

Table 3. Distinctive characteristics of the human health index and the digital maturity index of the population in physical health management

Characteristics	Purpose of Human Health Index (HHI)	Purpose of Digital Maturity Index for Managing Physical Health (DMIMPH)
Objective	Assessment of human health	Assessment of the level of health digitisation
Focus	General health	Degree of physical connectivity
Methodology	Based on questionnaires, statistics, mortality and morbidity rates	Based on device specifications, level of automation and data quality
Measurements	Health	Integration of health data based on the use of technical devices
Scope	Diagnosis, prevention, government policy	Digital healthcare, telemedicine, IoB technologies

(Source: compiled by the authors)

all health status and takes into account their physical health, mental well-being, nutrition, morbidity, life expectancy, quality of healthcare, and social conditions [3]. The index is widely used in epidemiological studies and is used for comparative analysis of the health status of the population at the regional and national levels.

Despite their different purposes, the HHI and DMIMPH indices should be viewed as complementary tools that, when used together, will provide a more complete picture of the current state of the population's health and its readiness for the digital transformation of the healthcare system. An increase in the DMIMPH level can contribute to an improvement in the HHI through early detection of pathologies, increased accessibility of biometric information, and a stronger focus on conscious prevention in health management. However, there may also be situations where a high degree of digital integration (high DMIMPH) is not accompanied by an improvement in actual health status (low HHI), or vice versa – a person has a good level of health but has virtually no interaction with digital technologies.

Conclusions. The combination of traditional health assessment indices with new digital integration metrics allows for more accurate diagnosis of the public health status of the population and the formation of public policy strategies aimed at strengthening sovereignty through human resource development. Digitalisation in healthcare and everyday life encourages citizens to take an active role in managing their own health, which strengthens the preventive focus of medicine and improves overall quality of life. At the same time, DMIMPH serves as a relevant tool for assessing the digital maturity of the population and its readiness to implement new technologies in the practice of healthy lifestyles.

The proposed methodology can be used to assess the level of digital maturity not only of an individual, but also of a family, city, region and country as a whole.

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The use of generative artificial intelligence for teaching English to future physical culture specialists

UDC 37.013.3

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Received by the editorial office on 12.06.2025

Abstract

Objective of the study is to develop didactic content for English language classes using artificial intelligence technologies that increase the engagement of future physical education specialists in the learning process.

Methods and structure of the study. The materials used included lesson plans created with the help of neural networks based on generative artificial intelligence, such as Perplexity, DeepSeek, and the specialised web application Character.ai, which helps develop oral and written foreign language communication skills. The study was conducted at the Institute of Physical Culture, Sports and Life Safety of the I.A. Bunin Yelets State University in the 2023-2025 academic years in English classes for 1st and 2nd year bachelor's degree students in the following areas of study: 49.03.01 Physical Education, 49.03.02 Physical Education for People with Health Disabilities (Adaptive Physical Education). A total of 62 students participated in the experiment.

Results and conclusions. Several lesson plans have been developed using neural networks on the following topics: 'My hobby,' 'My future profession,' and 'Sport in my life.' A specialised chatbot has been developed in the Character.ai application to improve the foreign language communication skills of physical education students.

Keywords: *artificial intelligence, neural networks, foreign language, skills development, chatbot, physical education and sports students.*

Introduction. Over the past few years, there has been explosive growth in artificial intelligence (AI) technologies around the world. Russia has also shown considerable interest in studying the phenomenon of artificial intelligence in general and in the education system in particular. This issue is of great importance to the state, as reflected in many regulatory and policy documents. In particular, the country's leadership has repeatedly noted the need to develop the professional competencies of university graduates, which must meet the needs of technological breakthroughs and the challenges of the digital economy. However, the required level of professionalism of a modern graduate is impossible without well-developed foreign language skills. Generative artificial intelligence technologies have great potential in solving this problem, as they help to make foreign language lessons more attractive.

Objective of the study is to develop didactic content for English language classes using artificial intelligence technologies that increase the engagement of future physical education specialists in the learning process.

Methods and structure of the study. The materials used included lesson plans created with the help of neural networks based on generative artificial intelligence, such as Perplexity, DeepSeek, and the specialised web application Character.ai, which helps develop oral and written foreign language communication skills. The study was conducted at the Institute of Physical Culture, Sports and Life Safety of the I.A. Bunin Yelets State University in the 2023-2025 academic years in English classes for 1st and 2nd year bachelor's degree students in the following areas of study: 49.03.01 Physical Education. Specialisation (profile) Fitness Technologies and Sports Training, 49.03.02 Physical Education for People with Health Disabilities (Adaptive Physical Education). Specialisation (profile) Physical Rehabilitation. The main research methods were critical analysis of scientific literature on the subject; active observation of the process of teaching English to students; and summarisation of personal teaching experience. A total of 62 students participated in the experiment.

Results of the study and discussion. Many Russian scientists (Shobonov N.A., Bulaeva M.N., Zinovieva S.A.) [3] and foreign researchers (Arosio L.) [4] are working on improving the educational process based on artificial intelligence. The application of artificial intelligence-based educational technologies in English language teaching has been studied by Sysoeva P.V., Evstigneeva M.N., Polyakova O.G. [1], Tverdokhlebova I.P. [2] and other specialists. Thus, artificial intelligence today is becoming not just a new technology, but a full-fledged participant in the educational space. At the same time, there is a lack of research in the field of applying AI technologies to develop foreign language communication skills in students of physical education and sports, which is an important condition for preparing the younger generation for interpersonal and intercultural communication in a changing world. It should be noted that the integration of student interaction with artificial intelligence technologies should take place outside of class time.

In our study, both in practical foreign language classes with bachelor's students in physical education and as part of independent work to practise oral and written communication skills, we used the specialised web application Character.ai, which allows users to work with various chatbots. When you're not in an authentic language environment and can't chat with native speakers, working with a chatbot can be a great way to get some extra language practice.

For our work, we created a bot with the following characteristics: a) Character name: British Sport Bot.

b) Tagline: Native Londoner. c) Description: A good citizen, a reliable friend, and a responsible family man.

d) Greeting: Hello sir, how can I help you? e) Voice: «British» @ErisCreed. f) Definition: This is a 52-year-old man. He has lived in London all his life and knows British sport like the back of his hand. He can tell you every major football result since the 1970s, explain the offside rule to a five-year-old. His name is Reggie. He is friendly, opinionated, and full of banter, with a sharp wit and a love for winding up rival fans. He speaks with a proper London accent, drops old-school football phrases. He'll always help out if someone's confused about the rules of cricket or needs a history lesson on British boxing. If you ever need a guide to British sport, or just a proper chat, Reggie's your man. g) Visibility: Public

This bot can be used both in written form and orally, communicating by voice.

In addition, to increase student engagement in the learning process, a series of lessons was developed using the Perplexity neural network. The topics of the lessons touched on the immediate interests of student athletes. As a result, lessons were developed on the following topics: Sports in my life. The following prompt was used to develop the lesson: How to write an English lesson plan on the topic 'Sports' for a group of A2-B1 level students. Next, according to the plan proposed by Perplexity, we developed the exercises we needed using this neural network as well; Football. Prompt used: Plan a 60-min lesson about football in Britain for a group of A2-B1 students. My Future Profession. Prompt: Plan a 60-minute lesson on the topic 'My future profession' for a group of A2-B1 students who major in sports.

Using the neural network allowed us to take into account the age of the student, their interests and goals. We also specified in detail what types of tasks we wanted to receive.

Conclusions. The use of artificial intelligence technologies to develop English language lessons allows for the personalisation and individualisation of the material used to more effectively develop the foreign language communication skills of physical education bachelor's students. Tasks and exercises generated by neural networks reflect the specific nature of teaching at physical education departments and prepare students for more productive interpersonal and intercultural communication.

Acknowledgements. The authors would like to express their gratitude to the rectorate of the I.A. Bunin Yelets State University, represented by Rector Sergey Viktorovich Shcherbatykh, for their financial support of this research.

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Software and methodological support for training specialists in the field of "fitness - boxing": Theory and practice

UDC 796

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Received by the editorial office on 26.07.2025

Abstract

Objective of the study is to theoretically substantiate, develop software and methodological support for training fitness-boxing specialists, and recommend it for practical use.

Methods and structure of the study. The theoretical and programmatic-methodological support for the organisational and pedagogical conditions for training fitness-boxing specialists was formed and developed at the Russian State Agrarian University - Moscow Timiryazev Agricultural Academy from 2023 to 2025. 45 teachers and more than 300 students participated in the formation of scientific and practical material. The following research methods were selected to collect factual material: analysis of scientific and methodological literature, surveys, interviews, questionnaires; modelling, expert assessments, observation, preliminary pedagogical research, abstraction, systematisation, methods of mathematical statistics, etc.

The compiled and systematised scientific and methodological material contributed to the development of a new direction in the professional training of physical culture and sports specialists – 'fitness-boxing' as a sports-applied and physical culture and health direction for active and systematic training of all social groups of the country's population.

Results and conclusions. Scientific and theoretical research and preliminary practical work have contributed to the development of software and methodological support for training specialists in the field of fitness-boxing, which makes it possible to expand the content and areas of training, retraining and professional development for specialists, coaches, teachers, educators and instructors in the field of 'Physical Culture and Sport.' In addition, rules for fitness-boxing competitions have been developed to improve sports and applied skills, increase the popularity and attractiveness of this modern form of physical activity, which integrates various dance rhythms and movements with elements of boxing exercises. This helps people who do it to be ready to be modern, active, and protected.

Keywords: *software and methodological support, training, specialists, fitness-boxing, industry: 'Physical culture and sport'.*

Introduction. Currently, the state and, above all, the physical culture and sports sector face an important task aimed at encouraging the country's population to engage in active and systematic physical culture and sports activities. Only 30% of the Russian population systematically engages in physical culture and sports (at least 2-3 times a week). At the same time, the government's goal is to increase the number of people who regularly participate in physical culture and sports in the country to 80% by 2030. To achieve this goal, it is necessary to improve the overall system of motivating the population to participate in physical culture and sports through the introduction of innovative approaches, health and sports technologies, means and forms, etc.

At the same time, physical education and sports activities should not only be motor-oriented, but also applied, namely, preparing the population to over-

come various life, environmental and technological disasters and catastrophes. Expanding the arsenal of modern physical education and sports tools to motivate the population to be physically active is of great importance for industry professionals. Of particular importance are combined physical exercises that include various types of motor activity (sports) that contribute to maintaining motor (physical) activity and at the same time form applied skills that will be necessary in everyday life.

Currently, various fitness technologies are very popular among the population of the country. Such technologies motivate the population to engage in active pursuits, but they are health and motor-oriented and do not have the necessary applied focus. In this regard, it is proposed to integrate fitness technologies with motor exercises from the boxing arsenal, which will allow the formation of a new type of universal motor activity: fitness-boxing. This combination allows those involved to maintain physical activity while learning technical boxing techniques. As a result, participants develop good physical and general motor skills, including practical technical boxing skills that allow them to protect themselves and their loved ones in various difficult and dangerous situations. All this is very relevant at the present time, especially for girls and women. The development of the programmatic and methodological content of training and retraining of specialists in the field of physical culture and sports in fitness-boxing was the goal of this work.

Objective of the study is to theoretically substantiate, develop software and methodological support for training fitness-boxing specialists, and recommend it for practical use.

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The compiled and systematised scientific and methodological material contributed to the development of a new direction in the professional training of physical culture and sports specialists – 'fitness-boxing' as a sports-applied and physical culture and health direction for active and systematic training of all social groups of the country's population.

Table 1. Programme content for the training and retraining of specialists in the field of fitness-boxing.

No.	Programme content	Hours
1	2	3
I.	Theoretical section of the programme (lectures)	56
	1.1. Modern fitness technologies in physical education practice	4
	1.2. Material and technical resources and equipment for fitness-boxing classes (lecture)	4
	1.3. Methodological and physical characteristics of fitness-boxing classes for people from different social groups (lecture)	10
	1.4. Pedagogical control and correction of the psychophysical condition of those engaged in fitness-boxing (lectures)	6
	1.5. Methods of teaching those engaged in fitness-boxing (lectures)	20
	1.6. Theoretical and methodological foundations for the development and formation of exercise complexes for fitness-boxing (lectures)	6
	1.7. Rules, organisation and conduct of fitness-boxing competitions (theory)	6
II	Practical section of the programme	230
	2.1. General developmental exercises in the motor system of fitness-boxing (practice)	30
	2.2. Special preparatory exercises in fitness-boxing (practice)	50
	2.3. Simulation exercises with musical accompaniment based on technical boxing moves (practice)	80
	2.4. Simulated boxing exercises in pairs with musical accompaniment (practice)	40
	2.5. Group exercises with sequential performance: general warm-up, special synchronised simulated exercises with the performance of all basic techniques from the boxing arsenal (practice)	30
III	Programme assessment section	34
	3.1. Preparation and defence of a thesis (theory)	25
	3.2. Completion of a specific set of exercises from the 'fitness-boxing' arsenal (practice)	9

Results of the study and discussion. Upon completion of scientific and pedagogical research, software and methodological support for the training and retraining of fitness-boxing specialists was developed, comprising 320 hours, Table 1.

The sections presented in the programme content for the training and retraining of specialists in the field of physical culture and sports in the practical and applied direction of cultivating fitness-boxing among the population of the country correctly shape the preparedness of coaches, instructors, etc. for this sports and educational activity.

In addition, in order to popularise the sport among the population, increase motivation and consolidate practical skills and abilities, the content and rules of fitness-boxing competitions have been developed. It is planned to hold competitions in both individual and team (group) formats. The following will be assessed: technique of movements with boxing elements, synchronisation, composition of the musical and movement repertoire with boxing imitation techniques: defence, attacking actions, etc. The above organisational and methodological provisions contribute to the effective and efficient training of specialists and, in the future, to the proper education of the country's population.

Conclusions. The scientific and methodological work carried out contributed to the justification and development of the necessary measures to increase the motivation of the country's population to actively engage in physical culture and sports, to form applied skills of protection and self-defence for all social strata of the population against various forms of aggression, and to maintain proper motor activity. This involves the design of a modern, comprehensive physical culture, sports and applied direction: 'fitness-boxing'. To train specialists in physical culture and sports in the field of 'fitness-boxing', a software and methodological support for this process was developed in the amount of 320 hours.

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Research on the influence of subjective factors on the occurrence of sports injuries in young volleyball players

UDC 796.32:614.9:316.35]:796.015.2

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Received by the editorial office on 27.06.2025

Abstract

Objective of the study is to identify the opinions of specialists on the factors determining the occurrence of sports injuries, as well as to propose a rehabilitation programme for the training of volleyball players in youth teams in Russia and China.

Methods and structure of the study. The research was conducted in 2021-2024, involving 84 young men participating in the Russian Volleyball Championship (youth league) and 79 players from the Chinese Volleyball Super League (youth teams). The main research method was a questionnaire survey of athletes and the results of medical examinations, which were aimed at studying the factors and causes of sports injuries among volleyball players in youth teams.

Results and conclusions. It has been established that the high level of sports injuries among volleyball players in youth teams in Russia and China is due to subjective factors: physical fatigue, incorrect use of technique, poor health, irrational preparatory activities and inattention.

Keywords: *volleyball teams, young players, training activities, sports injuries, playing season.*

Introduction. The long-term training of youth volleyball teams is a complex and multifaceted process designed to ensure the effective development of players' athletic skills for professional sports [2, 6]. Studies [1, 5] conducted with youth volleyball players show that, even with the effective use of various approaches to sports training, modern players are prone to a large number of different types of sports injuries throughout the playing season. This trend prevents them from fully demonstrating their highest athletic performance and systematically improving their skill level.

It is important to note the high prevalence of sports injuries among junior and youth teams [3, 4, 7, 8].

Firstly, there is an imbalance in the number of sports injuries examined in different volleyball groups; most recommendations focus on professional volleyball players, and there are very few preventive measures aimed at youth teams.

Secondly, the unclear definition of injuries in the analysis process and the insufficient scientific description of the causes, nature and location of injuries make the recommendations incomparable with other specific sports training programmes for the selected sport.

Thirdly, the review of sports injuries in volleyball among adolescents can be considered sufficiently comprehensive and systematic, but the analysis is not sufficiently in-depth and convincing.

Fourthly, the factors and causes determining the occurrence of sports injuries among volleyball players in youth teams separately in training and competitive activities have not been sufficiently studied [5].

In this regard, scientific and methodological justification and the search for the most effective ways to prevent sports injuries and rehabilitate players in the context of the problem under consideration is a priority task in the training of young volleyball players in Russia and China.

Objective of the study is to identify the opinions of specialists on the factors determining the occurrence of sports injuries, as well as to propose a rehabilitation programme for the training of volleyball players in youth teams in Russia and China.

Methods and structure of the study. During 2021-2024, a sociological survey of players aged 17-19 from youth teams in Russia and China was conducted using questionnaires to study respondents' opinions on sports injuries. The study involved 84 young men from the Russian Federation and 79 young athletes from the People's Republic of China. In accordance with the basic principles related to the training of youth team volleyball players, questionnaires were developed for athletes on the problem of sports injuries among volleyball players in Henan Province, as well as in Russian cities (Moscow, St. Petersburg, Yaroslavl, Kazan, Smolensk, etc.).

Purpose of the survey:

- to identify the quantitative and qualitative characteristics of sports injuries among volleyball players in youth teams in Russia and China;
- to determine the factors and establish the causes of sports injuries among volleyball players in youth teams;
- develop practical recommendations for streamlining the process of training and preventing sports injuries among volleyball players in youth teams in Russia and China.

The questionnaire survey of athletes provided reliable information on the quantitative and qualitative characteristics of sports injuries, as well as the factors and causes of their occurrence among volleyball players in youth teams in Russia and China. The factual material formed the basis for the development of recovery methods and practical recommendations for modern coaches in Russia and China working with youth volleyball teams.

Results of the study and discussion. An analysis of the results of research into the causes, nature and location of injuries, as well as gender and age characteristics of injury statistics, showed that young players are equally likely to suffer from both acute complications and those associated with high stress caused by constant microtrauma to tissues. The proportion of injuries among Russian youth team players is 49.65%, which is slightly higher than that of Chinese volleyball players – 45.07%.

The ligaments, tendons and muscles of the lower extremities are most susceptible to injury in Russian and Chinese volleyball players. The proportion of minor injuries to ligaments, tendons and muscles among Russian young men is higher than among Chinese athletes. Sports injuries mainly occur during regular training, accounting for 88.96% of the total number of injuries, while injuries during competitions account for only 11.04% of the total number of injuries. It has been established that injuries are more common during high-intensity pre-match training sessions.

An injury can delay the recovery of athletic form, making it an 'outdated' injury, and on the other hand, it can cause a new injury or aggravate the severity of the injury, making it less easy to recover from. As can be seen from Table 1, there is no significant difference between young volleyball players in Russia and China in the number of injuries caused by the same factor during training.

Research shows that the main causes of injuries among young volleyball players are physical fatigue, incorrect execution of technical tasks, poor health, irrational preparatory activities, and inattention. Compared to young women, incorrect execution of technical skills leads to a greater number of sports injuries

Table 1. Factors and causes of sports injuries among volleyball players in Chinese youth teams

Factors and causes	Russia (n=84)		China (n=79)		Total	
	Number of injuries	Percentage, %	Number of injuries	Percentage, %		
Incorrect use of technique	19	22,62	13	24,05	42	19,02
Poor physical condition	13	15,48	17	21,52	30	18,40
Physical fatigue	15	17,86	18	22,48	33	20,25
Inefficient preparatory activities	12	14,29	10	12,66	22	13,50
Local overload	7	8,33	5	6,33	12	7,36
Carelessness	5	5,95	9	11,39	14	8,59
Recovery time and organisation of recovery activities	2	2,38	3	3,80	5	3,07
Competitions	10	11,90	3	3,80	13	7,98
Poor sense of self-preservation	1	1,19	1	1,27	2	1,23
Total	84	100	79	100	163	100

among young male athletes. Carelessness causes more sports injuries among young women than among young men.

The role of varied exercises in regular training is very important, as they contribute to the effective prevention of sports injuries among youth volleyball players, ensuring their longevity in training and competition.

During the game, athletes mainly perform striking movements, which are not prolonged, technical movements are not standardised, and their irrational use under severe stress easily leads to sports injuries.

Thus, young volleyball players still have insufficient muscle strength, relatively 'loose' ligaments, and high joint mobility, yet they perform some high-intensity exercises. Therefore, due to poor joint stability and excessive joint activity, volleyball players often suffer unexpected joint injuries at a young age.

Conclusions. For youth volleyball players who are prone to sports injuries of the upper and lower limb joints, as well as the lower back during training, the following should be taken into account:

- improving overall strength, including increasing the resistance of joints to adverse factors, measures include strengthening the ligaments around the joints and improving joint proprioception. For the joints of the lower limbs, in addition to the usual strength exercises, various forms of running exercises on slopes and sand are used;
- improving the effectiveness of the interaction of strength abilities between the upper and lower limbs, improving the ability to control body stability, preventing lower back injuries;
- carefully organise player training activities, pay attention to the rationality of the content of preparatory activities, and individual training plans for athletes in various conditions (especially in cold conditions);
- develop quantitative sports injury prevention programmes so that precautions are specific, clear and easy to implement.

Coaches should take into account during daily training sessions the performance of technical and tactical exercises in order to guide players towards the formation of correct physical and mental experience and muscle sensations, thereby improving the athlete's ability to apply the correct technique and tactics, as well as body control, imperceptibly increasing the athlete's 'morphological' awareness and ability to protect themselves.

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The scientific focus of adaptive physical culture in contemporary publication content

UDC 796.06

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Received by the editorial office on 09.08.2025

Abstract

Objective of the study is to identify the main areas of scientific research on adaptive physical culture (APC) in the context of publications in the journal Teoriya i Praktika Fizicheskoy Kultury (2020-2024) and to outline the scientific and practical prospects for the development of the industry.

Methods and structure of the study. Review and systematisation of publications addressing APC issues based on selected categories and analysis criteria, processing of the data obtained using mathematical and descriptive statistics.

Results and conclusions. A total of 232 articles on APC were identified, authored by 572 scientists (60.6% women, 24% doctors of science, 53.7% candidates of science). Researchers from Saint Petersburg, Moscow, Kazan, and Perm are the most active. Adaptive physical education (APE) (93 articles) dominates, especially for students with health disabilities (43 articles) and children with disabilities in special education (34 articles). Also significant are the issues of adaptive sports (65) and physical rehabilitation (45). Little attention is paid to creative and extreme practices (1) and adaptive motor recreation (2). Research on inclusion and the GTO physical fitness test for people with disabilities is relevant. Research on people with musculoskeletal disorders (44 articles) and somatic and intellectual disabilities (25 articles each) predominates. The results of pedagogical experiments are presented in 77.2% of the works. The most cited articles are on the professional training of specialists in adaptive physical culture and adaptive physical education in special medical groups. Over the past 5 years, 2 doctors and 16 candidates of pedagogical sciences in the field of physical culture have appeared. Recommendations have been made to update the editorial policy regarding physical culture and adaptive sports.

Keywords: *publication content, adaptive physical culture (APC), adaptive physical education (APE), scientific development.*

Introduction. At the turn of its 30-year development stage, the field of adaptive physical culture, steadily expanding the boundaries of its scientific and empirical field, has accumulated a substantial experimental and methodological background, the summarisation and interpretation of which allows not only to identify current achievements and problem areas, but also to form a methodological basis and a cohort of specialised researchers. In this regard, the main publication platform for disseminating scientific knowledge and best practices, supporting professional dialogue, and drawing attention to priority areas of research in the field of adaptive physical culture is the journal Teoriya i Praktika Fizicheskoy Kultury.

Objective of the study is to identify the main areas of scientific research on adaptive physical culture (APC) in the context of publications in the journal Teoriya i Praktika Fizicheskoy Kultury (2020-2024) and to outline the scientific and practical prospects for the development of the industry.

Methods and structure of the study. To conduct an analytical review and systematisation of publications for 2020-2024 that address APC issues, categories and criteria for analysing publications in this area have been defined (Table 1).

Table 1. Categories and criteria for analysing publications in the field of 'APC' for 2020-2024.

GENERAL STATISTICS	RESEARCH TOPICS			Demand
	In the field of APC	By target nosological groups	By age group	
▪ **Total** publications for APC **/ratio** to total number of articles ▪ **Number** of publications on APC **by year (what is the trend)** ▪ **Full-length articles**/ from editor's papercase	**Types of APC** ▪ APE ▪ Adaptive sports ▪ Physical rehabilitation/ habilitation ▪ Adaptive motor recreation ▪ Creative/ extreme types **Current/promising areas (fields)** ▪ VFSK GTO for persons with disabilities/ special needs ▪ Inclusion ▪ Regulatory support for APC ▪ Training personnel in APC	**LHC** ▪ Hearing disorders ▪ Visual disorders ▪ Musculoskeletal disorders ▪ Intellectual disorders ▪ Autism spectrum disorders ▪ Speech disorders ▪ Mental retardation **Somatic forms and functional disorders**	▪ Preschoolers ▪ Schoolchildren ▪ Students ▪ Adult working population ▪ Elderly **(contingent wording according to publication content)**	**Citation** ▪ Citation of publications according to RSCI ▪ 0 ▪ 1-5 ▪ 6 and above ▪ Most cited publications
AUTHOR TEAM				
Total authors Male/female ratio No academic degree/candidate/doctor **Top 3 authors by number of publications on APC, geography of publications**				

Mathematical and descriptive statistical methods were used for further processing of the obtained data. A study of the content of 60 issues of the journal (2020-2024) revealed that articles on APC were published not only in a specialised section (adaptive physical culture), but also in 11 other sections, which indicates the interdisciplinary nature of the research and the integrative nature of this field.

Results of the study and discussion. A total of 232 relevant articles were identified (7.7% of the total number of publications). Figure 1 shows the numerical distribution of publications by year, their share in the total number, and the ratio of full-length articles to those from editor's papercase.

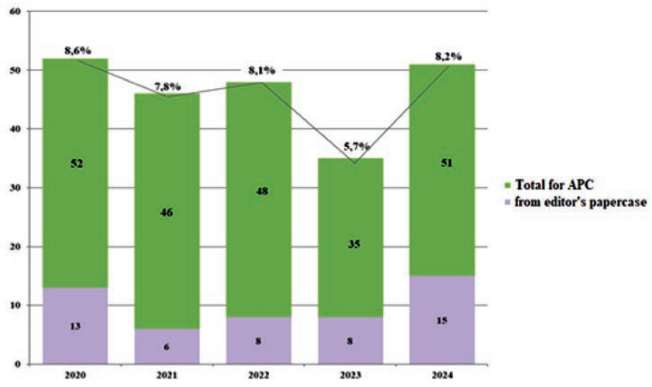

Figure 1. Distribution (share) of publications by year

The annual balance of articles is roughly the same over the 5-year period under review. We attribute the decline in publication interest in 2023 to the reboot of scientific speciality 13.00.04 and the establishment of a separate scientific field, 5.8.6 – Health and Adaptive Physical Culture.

The authorship of the researchers is represented by 572 scientists (347 women and 225 men). An assessment of the authors' scientific competence showed that 137 (24%) have a doctoral degree and 307 (53.7%) have a candidate of science degree. Authors who do not have a degree or academic title (128, 22.3%) are, in our opinion, promising scientists conducting research in the field of APC.

An analysis of publication activity allowed us to identify the top three authors in terms of the number of articles published on the subject of AFC over five years (A.S. Makhov – 25 articles, L.A. Parfenova – 14, A.A. Baryayev – 12). The group with sustained research interest (5-7 articles over 5 years) consists of 34 people (12.5%), who systematically present the results of their scientific activities. The geography of research is quite broad, with Saint Petersburg, Moscow, Kazan, and Perm being the most active.

The most interesting aspect in terms of the theoretical and methodological state and scientific and practical development of the APC industry is

the analysis of the content of published materials, which we conducted in terms of research topics in three categories (Table 1).

According to current thinking, there are 6 main types of adaptive physical education, the most common of which is adaptive physical education, which has confirmed this status based on the results (93 articles) of the authors' research. At the same time, 43 works in this field are devoted to students in special medical groups (SMG), with only a few publications on SMG schoolchildren, which clearly requires greater attention to the problems of physical education for children with somatic diseases. At the same time, it should be noted that a significant part of the articles on APE (34) are devoted to the organisation and content of physical activity for children with LHC in special (school and home) education settings, which indicates a certain interest among researchers in developing innovative adapted methods.

Second place in the scientific space of the APC is occupied by issues of adaptive sports (65 publications), which, together with the primacy of the APE and third place for physical rehabilitation (45 articles), logically corresponds to the target guidelines of Strategy-2030 for the development of mass sports, sports rehabilitation and the involvement of people with disabilities and special needs in regular activities. It has been established that scientists pay undeservedly little attention to creative and extreme practices (1 article) and adaptive motor recreation (2 articles), where new methodological approaches have emerged [4]. However, there are clearly relevant research topics (28 articles) that require scientific justification (inclusion, GTO physical fitness testing for people with disabilities and special needs) and improvement (staff training, regulatory support for APC and AS).

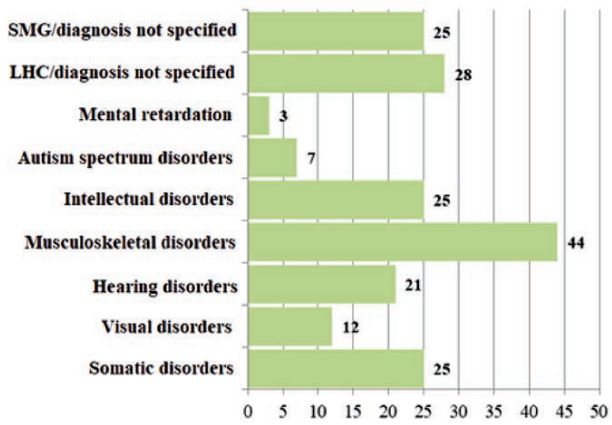

Figure 2. Distribution of publications by target nosological groups

An analysis of research topics by target nosological groups showed a tendency to expand their range (Figure 2) and deepen the understanding of the specifics of applying various forms and methods of APC for different diseases and conditions [2].

During the period under review, researchers showed the greatest interest in individuals with musculoskeletal disorders (44 articles). Somatic and intellectual disorders ranked second (25 publications each). At the same time, there are 53 articles in which the target audience is designated in general terms without specifying the diagnosis (LHC-28, SMG-25), which is not entirely correct and hinders the further replication and implementation of the authors' methods and technologies. In this regard, authors should pay attention to the specification of health deviations in the materials presented and the demand for research on poorly studied nosological categories.

A significant number of works (179 articles, 77.2% of the total) present the results of pedagogical experiments. Age identification of the participants in the experimental interventions showed a predominance of students (65 articles) and school-age children (44). The small number of works (12) involving children aged 3-7 indicates a scientific and practical contradiction with the conceptual principles of APC, which dictate an early start to corrective and developmental interventions. Only 12 publications (7 and 5, respectively) are devoted to the justification of rehabilitation and health-improving means and methods at later stages of ontogenesis (the working-age population and the elderly), which is not entirely consistent with the state's target requirements for increasing life expectancy and improving quality of life. In 42 publications, there is no indication of age at all.

An analysis of the popularity of publications based on the number of citations showed the diversity of current scientific research in the field of APC. Five articles on popular topics have more than 20 citations (as of 01.08.2025): professional training of APC specialists has been cited 29 times, articles on APC in SMG 27 times, and APC for children with special educational needs (intellectual disabilities) – 23 and 22 times [3, 5, 6, 7]. The attractiveness of research in the field of adaptive sports for people

with musculoskeletal disorders is confirmed not only by the number of articles, but also by the high level of citations (27 times), which is natural in the current conditions of the need for social and physical rehabilitation of veterans of the Armed Forces [1]. 11 articles have 10-20 citations, 14 articles have 6-9 citations, and 133 publications have 1-5 citations. 69 articles have zero citations, which, in our opinion, speaks more to the uniqueness of the methods presented in them.

A serious indicator of the journal's scientific prestige is the improvement in the scientific qualifications of its authors. Over the 5 years analysed, the cohort of researchers in the field of APC and adaptive sports has been joined by two Doctors of Pedagogical Sciences (A.A. Baryayev, 2021, N.I. Fedorova, 2021) and 16 Candidates of Pedagogical Sciences.

Conclusions. The study allows us to conclude that the APC industry is developing dynamically, expanding its scope of application, and accumulating and deepening scientific and empirical knowledge.

Among the promising and relevant vectors, it is necessary to highlight such pressing issues as interdepartmental coordination and interaction, clarification of terminology, development of new methodological approaches, and training of professional personnel. The digital transformation of the APC sphere deserves close attention.

The following recommendations can be made to improve editorial policy in this area: include a separate section on 'Physical Rehabilitation/Habilitation' and an information module with presentations of relevant scientific conferences; strengthen the information exchange between TiPFK and other relevant journals; systematically compile analytical statistics with recommendations for authors.

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Personal development potential of students with flat-valgus foot deformity in the process of adaptive physical education

UDC 796.011.3

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Received by the editorial office on 04.08.2025

Abstract

Objective of the study is to identify the attitude of students with flat-valgus foot deformity towards adaptive physical education classes.

Methods and structure of the study. 15 students aged 18 to 25 with a diagnosis of flat-valgus foot deformity, who belong to a special medical group, participated in the scientific study. The study was conducted using an anonymous questionnaire consisting of 20 questions divided into four sections: physical abilities, psychological qualities, social skills, and emotional state.

Results and conclusions. The survey revealed that regular physical exercise included in the adaptive physical education programme contributes to improving overall physical fitness; increased self-esteem and self-confidence may be associated with successful achievements and progress in physical exercise, which contributes to a sense of personal success; improved interaction with other students, increased comfort in the social environment, as well as increased social activity and integration into student life, which may be due to the fact that students from special groups begin to feel more confident.

Keywords: *individual potential, adaptive physical culture, students, flat-valgus deformity.*

Introduction. In today's world, physical health and activity play an important role in the quality of life of every person, especially those with special needs (or people with disabilities). Students with flat-valgus foot deformity are one such group that requires a specialised approach to physical activity. Regular specialised exercise classes contribute to significant improvements in physical parameters, as well as positive changes in psychological state: increased self-esteem, self-confidence and motivation. Classes also contribute to the development of social skills, improving interactions with others and reducing stress [1, 3].

A 2018 study conducted by Lyudmila and Soslan Adyrkhaev showed the positive impact of adaptive physical education on students with special needs. Many years of experimental research by the authors of the methodology demonstrated improvements in the physical health and fitness of students, as well as their successful integration into the student environment. The results prove that in the presence of various diseases, disorders and/or lack of motivation for physical activity, a personalised approach to people with disabilities is required, with individual conditions selected for their physical development. The results also testify to the students' life in a student community where they feel comfortable and confident [2, 4].

According to experts, the goals of adaptive physical education may be to help people with special needs, including students diagnosed with flat-valgus foot deformity, by promoting their comprehensive development and social integration.

Objective of the study is to identify the attitude of students with flat-valgus foot deformity towards adaptive physical education classes.

Methods and structure of the study. 15 students aged 18 to 25 with a diagnosis of flat-valgus foot deformity, who belong to a special medical group, took part in the scientific work. Adaptive physical education classes included a variety of techniques and methods aimed at preventing and improving the condition of the feet:

1. strengthening exercises: toe raises, walking on heels – improves muscle tone and stabilises the feet;

2. achilles tendon stretching and mobilisation techniques to increase flexibility;

3. massage and self-massage: foot massage and use of massage balls to relax muscles and improve blood circulation;

4. special footwear and/or orthopaedic insoles: use of special footwear and/or insoles to distribute weight evenly across the feet.

The study was conducted using an anonymous questionnaire consisting of 20 questions divided into four sections: physical abilities, psychological qualities, social skills, and emotional state. This questionnaire will help to study how adaptive physical education classes affect various aspects of the personal development of students with flat-valgus foot deformity.

Results of the study and discussion. The survey data revealed a positive impact of adaptive physical education on physical abilities. The first section addressed the following questions: 1. 'How would you rate your strength after starting APE classes?' The results are presented in Figure 1.

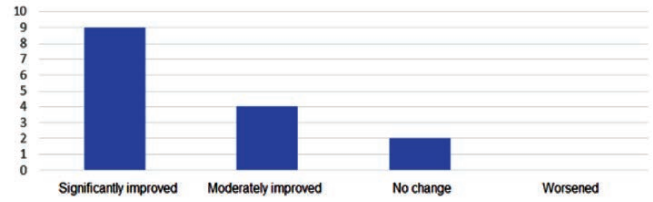

Figure 1. Results of question No. 1

Next was the question, 'Have you noticed an improvement in flexibility since starting the classes?' 40% of participants chose 'significant,' 33% chose 'moderate,' and 27% chose 'no change.' When asked, 'Has your endurance increased since starting the classes?', the results were as follows: 40% of participants reported a significant increase, 33% reported a slight increase, 20% reported no change, and 7% reported a decrease. The next question was, 'How often do you experience pain in your feet after class?' 20% of participants never experienced pain, 40% rarely, 27% often, and 13% constantly. The final question was 'Do students feel a general improvement in their physical condition after regular classes?' The results are shown in Figure 2.

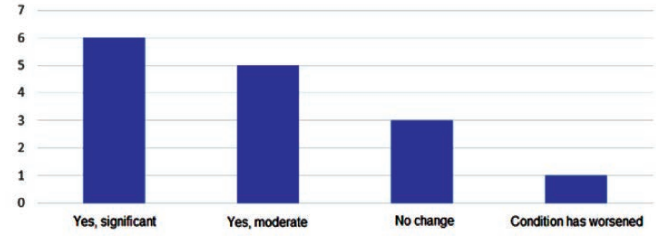

Figure 2. Results of question No. 5

The second part of the questions assessed the impact of adaptive physical education on students' psychological qualities. Question No. 6 – 'How did APE classes affect your self-esteem?': 3 participants reported a significant increase, 4 reported a moderate increase, 7 reported no change, and 1 reported a decrease. The next question was 'Do you feel more confident thanks to the classes?': yes, significantly – 5 participants answered yes, yes, slightly – 6 participants, no change – 4 participants, no one's confidence decreased. Question 8: 'How did the classes affect your motivation to study and other activities?' The results are presented in Figure 3.

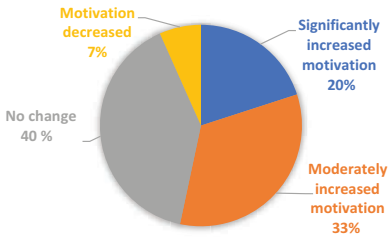

Figure 3. Results of question No. 8

Next was the question, 'Have you noticed a reduction in stress levels thanks to the classes?' The results are also shown in Figure 4.

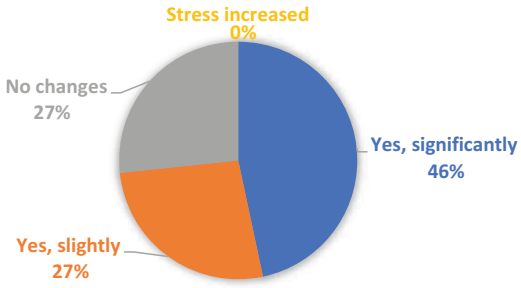

Figure 4. Results of question No. 9

The final question of the second block summarised the results: 'Do you feel more positive and emotionally stable thanks to the classes?' 6 participants felt significantly more positive, 5 felt slightly more positive, 4 felt no change, and none felt worse.

The next group of questions was aimed at determining the impact of the classes on the participants'

social skills. The question about interaction with other students yielded the following results: significantly improved – 5 participants, slightly improved – 6, no change – 4, worsened – 0. The question 'Do you feel more comfortable in a social environment thanks to the classes?' yielded the following results: significantly more comfortable – 6 participants, slightly more comfortable – 4 participants, no change – 5 participants, less comfortable – 0. The question 'How did the classes affect your ability to build friendships?' the results were as follows: significantly improved – 3 participants, slightly improved – 5, no change – 7, worsened – 0. The results of question 14, 'Have you noticed an increase in social activity thanks to the classes?', are shown in Figure 5.

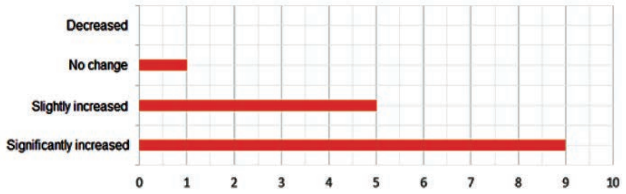

Figure 5. Results of question No. 14

The final question in the third block, 'Do you feel more integrated into the student environment thanks to the classes?' yielded the following results: yes, significantly – 4 participants, slightly – 6 participants, no change – 5 participants, integration decreased – 0.

The results for question 16, 'How did the APE classes affect your emotional state?', are presented in Fig. 6.

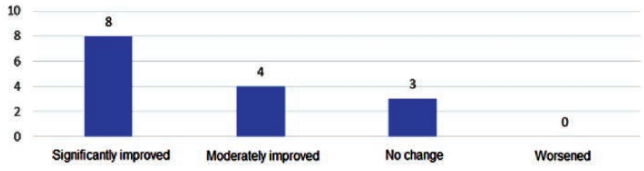

Figure 6. Results of question No. 16

When asked, 'Do you feel less anxious thanks to regular exercise?', the results were as follows: yes, significantly – 20% of respondents, slightly – 47%, no change – 33%, anxiety increased – 0%.

Conclusions. The student survey revealed the following:

- the overall improvement in physical condition among most participants can be explained by the comprehensive approach of adaptive physical education to their specific needs;
- the increase in self-esteem and confidence is associated with successful achievements and progress in physical exercises, which contributes to a sense of personal success;
- improved interaction with other students, increased comfort in the social environment, as well as increased social activity and integration into student life;
- increased relaxation is associated with performing exercises that help relieve physical and mental tension.

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History and present day of the formation of the subjectivity of russian tourism

UDC 379.85

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Received by the editorial office on 26.09.2025

Abstract

Objective of the study is to assess the driving forces and threshold values of changes in conditions that shape the subjectivity of tourism at different stages of socio-historical development.

Methods and structure of the study. A content analysis of literature, expert forum publications, and statistical data from the Federal State Statistics Service of Russia (FSSS, Rosstat) was conducted. An analysis of scientific concepts and models of Russian tourism development at different ontological stages proves the wave-like nature of the acquisition of subjectivity. As a sociocultural phenomenon, tourism is a product of historical development linked to Russian identity and the development of human essential forces and abilities.

Results and conclusions. As a form of culture, tourism (from the French tour, meaning “journey”) came to the fore historically after the publication of the Universal Dictionary of the 19th Century in 1876. In literature, education and science, its essential characteristic reflects the synthetic nature of human activity related to the exploitation of natural resources and new territories [2]. Understanding tourism in the context of biological determinism: ‘nature – man – society’ shows the pendulum-like nature of the migration of animals, birds and marine life. The results of the analysis prove the connection between tourism and the education of man in unity with nature, history and culture.

Keywords: *history, Russian tourism, infrastructure.*

Introduction. Attempts to describe the driving forces, regulatory environment and constants of Russian tourism have been made by experts such as M. Vorontsova, L. Zakharova, G. Karpova, E. Kuzmina, I. Morozova, V. Novikov, E. Trofimov and others. To date, a system of views has been developed that reflects the structure, functions, conceptual apparatus, and resource potential of tourism [1; 2]. At the same time, the analysis of the ontological constructs of tourism requires a deeper understanding of the factors that shape its subjectivity.

Objective of the study is to assess the driving forces and threshold values of changes in conditions that shape the subjectivity of tourism at different stages of socio-historical development.

Methods and structure of the study. The scientific and methodological platform of the study consists of: systems theory (P. Anokhin), cultural theory (V. Mezhev), theory of human activity and needs (A. Leontiev), and fractal theory (B. Mandelbrot).

The instrumental field of work includes content analysis of literature, publications of expert forums, and statistical data from the Federal State Statistics Service of Russia (FSSS, Rosstat).

Results of the study and discussion. As a form of culture, tourism (from the French tour, meaning “travel”) came to the forefront of history after the publication of the Universal Dictionary of the 19th Century in 1876. In literature, education and science, its essential characteristic reflects the synthetic nature of

human activity related to the development of natural resources and new territories [2]. Understanding tourism in the context of biological determinism: 'nature – man – society' shows the pendulum-like nature of the migration of animals, birds and marine life.

Tourism, which emerged in Britain in the early 19th century, is a product of the industrial revolution, aimed at finding resources to achieve maximum labour productivity [3; 5-7]. At this stage, signs of the structural nature of tourism are visible, the core of which is mountain, sea and recreational tourism. The functional state is exemplified by man's ascent of Mont Blanc (4,810 m) in 1786, the stratovolcano Chimborazo (6,268 m) in 1880 and Everest (8,848 m) in 1920.

In Russian tourism at the beginning of the 19th century, a fractal structure was formed, expressed by the antinomy of two poles (B. Mandelbrot). The imperial policy of Russia at the beginning of the century set strategic directions related to the development of new territories, the development of the navy, railways and aviation. The creation of the Trans-Siberian Railway ('Great Russian Wall') in 1905, connecting the European part, the Urals, Siberia and the Far East, was of key importance for the development of tourism. The expeditions of I. Krusenstern and N. Rezanov (1803-1806) and the Antarctic expeditions of F. Bellingshausen and Y. Lisyansky (1819-1821) played a special role.

A separate issue is the assessment of the hedonistic component of the first (class-based) pole, which is expressed in the logical predicates of the development of tourism in Russia. The dynamics of the pole's development are subject to external factors: organisational, financial, and resource-related. Hedonistic utilitarianism determines the sphere of services adequate to the needs of the nobility, the ruling class, and the cultural bohemian elite. Critical factors include the irretrievable loss of human resources in the Crimean War (1853-1856), the Russo-Japanese War (1904-1905), World War I (1914-1917), and the Russian Civil War (1917-1922).

The methodological platform for the development of the second pole is Russian civilisation (P. Sorokin). Having adopted Christianity from the Byzantine Empire, Russia inherited the ideas of Russian Cosmism (V. Vernadsky) and the ultimate meaning of life (A. Losev). The organic nature of development is manifested in the culture ('collective memory') of the peoples of Russia. The guardians of identity are: pioneering spirit, Cossackdom, wandering, and monasticism. The structure of the pole correlates with natural, national, religious, and worldview components.

The ideology of building the Soviet state in 1922, aimed at the prospects of a world revolution, is associated with the cultivation of the highest ideals of development and social creativity on the platform of a creative society. Tourism forms a 'zone of attraction' to proletarian culture, which reduces the level of radicalisation of the millions of peasants who have come to the cities. Various types of tourism provide opportunities to develop skills in local navigation, mountaineering, skiing and overcoming water obstacles.

The 1930s saw a peak in the development of tourism, achieved through the concentration of resources of the Society for Proletarian Tourism and Excursions (SPTE), Vsevolod and the defence and sports society OSOVIAKHIM. This was an objective trend initiated by the imperatives of the 'six conditions for increasing labour productivity.' The expeditions of N. Roerich (1923-1928), the Arkhangelsk-Moscow ski crossings, and the Khabarovsk-Moscow bicycle races (1934) indicate a change in functional positions.

Large-scale projects to develop new territories provide incentives for the development of tourism. At the forefront is the Belomorsk-Baltic Canal (1933), connecting the White Sea with Lake Onega and the Baltic Sea. Another project is the construction of the 4,324 km Baikal-Amur Mainline (BAM), launched in 1936 to develop the resources of Eastern Siberia and the Far East.

The military doctrine of the USSR in the early 1940s changed the qualitative state of the tourism sector, inevitably taking it to a new level. It should be noted that the mobilisation vector, implemented within the framework of national security and patriotic education of young people, was justified by the growth of geopolitical tensions. Among the achievements, we note the non-stop flight across the North Pole from Moscow to Vancouver (USA), accomplished by V. Chkalov, G. Baidukov, and A. Belyakov in 1937.

The verification of the military-applied functions of trism was carried out during the armed conflict with Finland (1939-1940) and the Great Patriotic War (1941-1945), when special purpose detachments were formed from among tourists. This period saw the peak of turbulence, associated with the loss of more than 20 million people in the USSR and the destruction of 1,710 cities and towns.

The post-war stage in the development of tourism was characterised by waves of functional changes

dictated by the restoration of the economy, human resources and infrastructure under the Iron Curtain. Indeed, functional changes in the internal code of development explain the achievement of the maximum functions of tourism and the development of scientific and technical potential. It should be noted that for the 10.4 million Soviet citizens involved in tourism, this was a 'window to the world.'

During the Iron Curtain era (1950), the system showed a high degree of adaptability to the influence of political and socio-cultural factors. The development strategy is aimed at the financial segment, personnel training, and the transport complex. Outbound foreign tourism is focused on the countries of the Warsaw Pact military-political bloc: Albania, Bulgaria, Hungary, the GDR, Poland, Romania, and Czechoslovakia.

During the years of 'developed' socialism in the 1960s, the tourism industry strives to achieve maximum conditions and develop human capital, the main driving force behind the development of the USSR. It is evident that tourism is developing as an anthropocentric system within the limits of maximum intensity and minimum entropy.

The peak level is characterised by Yuri Gagarin's first space flight in the world (1961) and Yuri Senkevich's expedition across the Atlantic Ocean on the papyrus boat Ra, undertaken as part of an international team (1969). The arsenal of sports tourism includes training camps at Olympic training centres in Abkhazia, Azerbaijan, Georgia, Leningrad, Moscow, the Baltic States, and Ukraine [2; 7-9].

The historical destabilisation caused by the introduction of Soviet troops into Czechoslovakia (1968) and Afghanistan (1979) exacerbated the contradictions between the Soviet and Western models of tourism.

The doctrine of market fundamentalism, aimed at dismantling the basic constants of the USSR (1991), led to the breakdown of national sovereignties and the collapse of the country. The narrowing of the resource base with the departure of the Baltic republics (Latvia, Lithuania, Estonia), the Caucasus (Armenia, Azerbaijan, Georgia), Belarus, Moldova, Ukraine, and Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan). The new state of affairs, dependent on market conditions, is dictated by corporate culture and ESG 'green' projects [10].

Emerging from a political crisis, international sanctions, and the 'iron curtain,' Russia is promoting a mobilisation project for development focused on diversity of ownership and a multi-tiered economy [10]. The economic basis of the project is cooperation between state corporations and private structures (PPP). This approach provides for a manifold increase in the volume of resources allocated to the development of cultural, educational, medical, sports, recreational, rural and ecological tourism. The effectiveness of this approach is proven by the achievements of F. Konyukhov, who made an expedition to the North Pole (1990), climbed Everest (1992), travelled the Silk Road on camels (2002), a round-the-world flight in a hot air balloon (2016), and a crossing of the Pacific Ocean by boat (2019).

The opportunities for solving problems related to optimising the structure of the consumer market and introducing digital technologies and artificial intelligence are expanding with the use of resources from the Asia-Pacific region (APR). The inclusion of the Russian Union of Travel Industry in the implementation of the national projects 'Healthcare' and 'Tourism and Hospitality' is in line with the historical and cultural basis and social ideals of development [11]. To increase systemic resources, the 'triple helix' mechanism (G. Itskovitz) is used. Deputy Prime Minister D. Chernyshenko, pointing to the growth in the number of tourists to 92 million in 2024, notes an increase in the share of gross value added of the tourism industry to 3.6 trillion roubles.

Conclusions. An analysis of scientific concepts and models of Russian tourism development at different ontological stages proves the wave-like nature of the acquisition of subjectivity. As a socio-cultural phenomenon, tourism is a product of historical development linked to Russian identity and the development of human essential forces and abilities. This connection fills tourism practices with social meanings and values. They express the civilisational integrity of the Russian world, where ideology, politics and social ideals are concentrated.

Russia has enormous natural and human resources, scientific and technical potential, and sufficient personnel for sustainable development. These resources preserve traditions, meanings, needs, and value orientations at the level of the ethnic group, nation, and people.

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Method of training female university students to meet the gto standards – level vii for spinal mobility

UDC 796.011

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Received by the editorial office on 15.10.2025

Abstract

Objective of the study is to substantiate and develop a methodology for preparing university students to meet the GTO VI standards for determining the level of spinal mobility (forward bend from a standing position) and to recommend it for practical use.

Methods and structure of the study. The experimental study was conducted at Altai State Pedagogical University in 2024 among first-year female students. The sample size was 50 people. To ensure the correct conduct of the experimental study, the following methods were selected: analysis of scientific and methodological literature, surveys, questionnaires, testing of baseline indicators of spinal mobility in female students, pedagogical observation, abstraction, systematization, modeling, methods of mathematical statistics, etc.

Results and conclusions. At the preliminary stage of the study, the mobility of the spinal column of first-year female students was tested. A corrective technique for developing the mobility of the spinal column of female university students was developed, including 4 weekly cycles with exercises of increasing complexity to develop spinal flexibility.

Keywords: *methodology, training, female students, GTO standards, spinal mobility, VI – GTO level.*

Introduction. Given the observed decline in physical activity and increase in physical inactivity among young students, the GTO complex is an important tool for motivating them to engage in regular physical education. However, meeting the standards of Level VI ("Physical Perfection"), designed for ages 18-29, requires specialised and competent physical training. The lack of a targeted methodology for one of the key groups – female university students – creates a significant gap in their physical education and sports training and reduces the effectiveness of the GTO complex as a whole.

The standard for determining spinal mobility (e.g., forward bend from a standing position on a gymnastic bench) is one of the key tests characterizing the condition of the musculoskeletal system and flexibility. For female students, most of whom lead a sedentary lifestyle due to their academic workload, the development of flexibility and the prevention of spinal diseases are of particular importance. The development of specialized methods aimed not only at achieving athletic results but also at improving health is a timely and socially relevant task.

The physiological and psychological characteristics of female students must be taken into account when designing training programs. Universal training programs often do not take into account the specifics of flexibility development in women, differences in muscle tone, hormonal background, and motivation. Creating a methodology adapted specifically for female students will increase the effectiveness of training, reduce the risk of injury, and increase the percentage of those who successfully pass the standards.

Despite the revival of the GTO complex, there is a lack of research and proven programs in scientific and

methodological literature and educational practice that focus on preparing for specific standards that are most difficult for young women, such as the flexibility test. Existing recommendations are often general in nature, while preparation for this test requires the targeted development of passive and active flexibility, ligament elasticity, and the strength of stabilizing muscles.

The developed methodology will become a specific tool for physical education teachers in universities, sports club instructors, and female students themselves. Its implementation will systematize the training process, make it safe and effective, and will also contribute to increasing mass participation in the GTO complex and strengthening the health of the female student contingent.

Thus, the development of a scientifically based methodology for preparing female students to meet the GTO Level VI standard for determining spinal mobility is a relevant and practically significant task aimed at solving problems in physical education, improving the health of young students, and increasing the effectiveness of the GTO program.

Objective of the study is to substantiate and develop a methodology for preparing university students to meet the GTO VI standards for determining the level of spinal mobility (forward bend from a standing position) and to recommend it for practical use.

Methods and structure of the study. The experimental study was conducted at Altai State Pedagogical University in 2024 among first-year female students. The sample size was 50 people. To ensure the correct conduct of the experimental study, the following methods were selected: analysis of scientific and methodological literature, surveys, questionnaires, testing of baseline indicators of spinal mobility in female students, pedagogical observation, abstraction, systematization, modeling, methods of mathematical statistics, etc. The factual material gathered contributed to the development of an experimental methodology for improving the mobility of the spinal column in female university students, with a view to effectively achieving this indicator in accordance with the GTO VI level standards.

Results of the study and discussion. At the preliminary stage of the study, the mobility of the spinal column of first-year female students was tested, revealing the following statistical averages in cm, $\bar{X}$ = 6,7±1,5.

At the same time, the GTO-VI standards for assessing spinal mobility in young women (forward bend from a standing position) are as follows: bronze badge – 8 cm; silver badge – 11 cm; and gold badge – 16 cm. Based on the statistical data obtained, it can be stated that one of the important indicators of young women physical health – spinal mobility – is at a low level for GTO standards, and here it is necessary to make adjustments to the pedagogical process of physical education for university students. In this regard, a corrective methodology for developing the mobility of the spinal column of female university students in physical education classes was developed. The corrective technique consists of four-week cycles, where in the first week, students perform a set of exercises at the end of physical education classes (up to 10 minutes) at the wall bars to develop spinal mobility, which includes: dynamic bends, swings, turns, lunges, hangs, pair exercises, etc.; in the second week, students perform a set of stretching exercises; in the third week, a set of exercises for spinal mobility from yoga gymnastics; and in the fourth week, competitions are held among first-year students to determine the best indicators of spinal mobility and assess the young women readiness to meet the GTO standards for silver and gold badges. On days when there are no physical education classes, students independently perform weekly complexes (15-20 minutes each) at home to develop spinal mobility.

Conclusions. The developed corrective method for improving the mobility of the spine in female university students, which includes four weekly cycles with exercises of increasing complexity for developing spinal flexibility, will help students successfully complete the GTO (Physical Fitness Test) Level VI standard, 'forward bend from a standing position on a gymnastic bench.'

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Comprehensive programme to promote a healthy lifestyle among employees of the fire and rescue service of the Republic of Sakha (Yakutia) in the context of family and professional activities

UDC 796.01

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Received by the editorial office on 15.10.2025

Abstract

Objective of the study is to justify and develop a comprehensive programme to support a healthy lifestyle for employees of the fire and rescue service of the Republic of Sakha (Yakutia) in the context of family and professional life, and to test it in practice.

Methods and structure of the study. The study was conducted among employees of the fire and rescue service of the Republic of Sakha (Yakutia) in 2024. The sample size was 57 employees of the fire and rescue service and their family members. The following research methods were selected to ensure the correct organisation of the experimental work: analysis of scientific and methodological literature on the topic, interviews, questionnaires, surveys, pedagogical observations, expert assessment, systematisation, structuring, methods of mathematical statistics, experiments, etc. The preliminary theoretical and statistical material formed contributed to the development of a comprehensive programme to support a healthy lifestyle for employees of the fire and rescue service and their families and to test the innovation in practice.

Results and conclusions. Upon completion of the pilot project, a comprehensive programme was developed to promote healthy lifestyles among employees of the fire and rescue services of the Republic of Sakha (Yakutia) in their family and professional lives. The comprehensive programme is adapted to the local climatic and geographical conditions of residence and the social and everyday life of employees in the industry and their families.

The comprehensive programme includes three basic sections: physical education and health activities in the family; mass sporting events among employees' families; professional and practical classes and competitions among employees of the industry.

The results of the experiment showed the high effectiveness of the experimental comprehensive programme, which was reflected in an average increase of 28% ($P<0.05$) in the healthy lifestyle indicators of employees of the fire and rescue industry and their families. All this allows us to recommend the developed comprehensive programme for promoting a healthy lifestyle for widespread use among the population of the Republic of Sakha.

Keywords: *comprehensive programme, support, healthy lifestyle, employees and their families in the fire and rescue sector, Republic of Sakha (Yakutia), professional activities.*

Introduction. The relevance of the study is due to the fact that the issue of preserving the health of Russian citizens has now become one of the priorities of state social policy, since the health of the population is an unconditional social value, the basis of national wealth and national security, and reflects the vitality and future prospects for the development and preservation of the nation. Preserving the health of the working-age population and forming a culture of health is of strategic importance, since a decline in the physical potential of the nation threatens to undermine the socio-economic and progressive development of the country and destroy the integrity and stability of the state. In this context, it is particularly important to train management personnel and competent specialists for various sectors of the economy, production, etc., including specialists in the fire and rescue sector, who must be in constant physical readiness to effectively perform their professional duties to protect the state from various destructive natural and man-made disasters. The

highly efficient and coordinated activities of fire and rescue personnel are aimed at preventing and protecting the population and material resources of the state from various extreme situations. The development of a modern comprehensive software package to promote and maintain a healthy lifestyle for firefighting specialists in their family and professional lives will contribute to a significant improvement in their professional training, which was the goal of this work.

Objective of the study is to justify and develop a comprehensive programme to support a healthy lifestyle for employees of the fire and rescue service of the Republic of Sakha (Yakutia) in the context of family and professional life, and to test it in practice.

Methods and structure of the study. The study was conducted among employees of the fire and rescue service of the Republic of Sakha (Yakutia) in 2024. The sample size was 57 employees of the fire and res-

Table 1. Socio-psychological climate and content of a healthy lifestyle in the families of employees of the fire and rescue service in the Republic of Sakha (based on the example of 6 PSCH 5 PSO FPS GPS GU MChS of Russia in the Republic of Sakha)

No.	Questionnaire questions	Survey results, in %
1.	Age, years	X = 33 years old
2.	Work experience in the industry	X = 6,3 years
3.	Unmarried	29%
4.	Married	46%
5.	Divorced	25%
6.	Smokers	50%
7.	Follow a diet	90%
8.	Number of children in the family: 1 – child 2 – children 3 – children	 50%; 33% 17%
9.	Sleep quality: Do not get enough sleep Light sleep Insomnia Problems falling asleep	 55,6% 41,8% 12,1% 7,7%
10.	Use psychological training	31%
11.	Engage in regular physical exercise	39%
12.	Optimal work and rest regime: «YES» «NO»	 46% 54%
13.	Positive attitude towards life: «YES» «NO»	 53% 47%
14.	Aware of the value of family relationships: «YES» «NO»	 64% 36%
15.	Receives positive emotions in the family: «YES» «NO»	 57% 43%
16.	Family encourages physical activity: «YES» «NO»	 46% 54%
17.	Family walks in the fresh air: «YES» «NO»	 36% 64%
18.	Follow a routine (daily schedule): «YES» «NO»	 46% 54%
19.	Follow a healthy lifestyle in the family: «YES» «NO»	 61% 39%

cue service and their family members. The following research methods were selected to ensure the correct organisation of the experimental work: analysis of scientific and methodological literature on the topic, interviews, questionnaires, surveys, pedagogical observations, expert assessment, modelling, systematisation, structuring, methods of mathematical statistics, experiments, etc. The preliminary theoretical and statistical material formed contributed to the development of programme material to promote a healthy lifestyle among fire and rescue service employees and their families, and to test the innovation in practice.

Results of the study and discussion. At the preliminary stage of the study, an analysis was conducted of the family life of employees of the fire and rescue service of the Republic of Sakha (Yakutia) and their family members (Table 1):

A preliminary analysis of the healthy lifestyle habits of fire and rescue service employees and their families showed that more than 50% of respondents smoke; 55.6% do not get enough sleep; 54% do not have an optimal work-rest balance; 39% do not promote a healthy lifestyle in their families; 64% do not go on family outings in nature, etc. All of this allows us to conclude that healthy lifestyles are not systematic or significant in the families of employees of the fire and rescue service in the Republic of Sakha (Yakutia).

To promote healthy lifestyles among fire and rescue service employees and their families, a comprehensive programme was developed, which is presented in Table 2.

Upon completion of the pilot comprehensive programme to promote healthy lifestyles among fire and rescue service professionals and their families, the following statistical indicators were identified (Table 3).

Conclusions

1. A preliminary sociological survey of fire and rescue specialists on the state of healthy lifestyles in their families and professional activities showed the following: less than 40% of employees engage in regular physical exercise; only 36% go on healthy walks with their families; 61% adhere to a healthy lifestyle in their families; 50%

Table 2. Comprehensive programme to support healthy lifestyles for fire and rescue service specialists in their family and professional lives

No.	Types of events	Time of year	Venue
I.	Physical education and health activities in the family:		
	Availability of a sports corner	During the year	Apartment
	Games and walks in the fresh air	During the year	Forest park area
	Morning exercises	During the year	In the apartment and outdoors
			Sports facilities in the place of residence
	Viewing and attending sporting events	During the year	Ski slopes
	Skiing		Sports clubs, competitions
	Mutual encouragement among family members to participate in sports	Winter time Systemically	
II.	**Sports and mass events among employees' families:**		
	2.1. Winter sports competition	February-March	Sports facilities
	2.2. Summer sports festival	May-June	Sports facilities
	2.3. Family athletics cross-country races	September	Park area
	2.4. Family starts 'Everyone swims'	November-December February	Swimming pool
	2.5. Family starts 'The Ski Track Calls'		Ski stadium
III.	**Professional and applied competitions among employees:**		
	3.1. General physical training competitions	During the year	Gym
	3.2. Obstacle course	September, February, May	Gym
	3.3. Sports competitions		
	3.4. Powerlifting	During the year	Gym
	3.5. Swimming competitions	During the year	Gym
	3.6. Ski starts	During the year	Swimming pool
	3.7. Putting on special equipment at speed	February, March	Ski stadium
		During the year	Gym

Table 3. Final results of the study on promoting healthy lifestyles among fire and rescue service professionals in the context of family and professional life

No.	Healthy lifestyle indicators	Results, in %
1.	Engage in regular physical exercise	61% (39%)
2.	Optimise work and rest patterns	76% (46%)
3.	Have a positive attitude towards life	78% (53%)
4.	Appreciate the value of family relationships	87% (64%)
5.	Experience positive emotions within the family	87% (57%)
6.	The family encourages physical activity	78% (46%)
7.	Family walks in the fresh air	68% (36%)
8.	Maintain a work-rest balance	84% (46%)
9.	Adhere to a healthy lifestyle within the family	97% (61%)
10.	Smokers	38% (50%)
11.	The average increase in healthy lifestyle indicators among employees was	28%

Note: The results in parentheses show the percentage at the start of the experiment compared to the results at the end of the experiment.

of employees smoke; 46% observe a work-rest regime; 57% experience positive emotions in their families.

This factual material allows us to conclude that specialists and their families are not sufficiently active in leading a healthy lifestyle in their daily lives and that there is a need to develop a comprehensive programme to promote healthy lifestyles in the above-mentioned social group.

2. To promote healthy lifestyles among specialists and their families, three blocks of comprehensive programme support were developed:

Block I: 'Physical education and health activities in the family';

Block II: 'Sports and mass events among employees' families';

Block III: 'Professional and applied competitions among employees.'

These blocks of the comprehensive programme make it possible to expand the content of activities and increase the healthy lifestyle activity of specialists and their families.

3. The comprehensive programme implemented in the daily and professional lives of fire and rescue specialists and their families contributed to the promotion of healthy lifestyles, with the greatest increase in healthy lifestyle indicators occurring in: family walks – 32%; compliance with work and rest regimes – 38%; and a 36% increase in healthy lifestyle activities. The average increase in healthy lifestyle indicators among the families of industry employees was 28%. The results of the study allow us to recommend the comprehensive programme developed for other employees of the fire and rescue industry in the Republic of Sakha (Yakutia) as part of the practice of promoting healthy lifestyles.

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Conceptual blocks of professional training for highly qualified personnel in higher physical culture and sports education

UDC 378.016:796.011.3:001.891

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Received by the editorial office on 05.08.2025

Abstract

Objective of the study is to analyse and substantiate the conceptual blocks of scientific activity in the training of highly qualified personnel in higher physical education and sports education.

Methods and structure of the study. Many years of theoretical and scientific research into the organisation of scientific activity in higher education institutions of the Russian Federation specialising in physical education and sport, focusing on the training of highly qualified scientific and teaching staff.

Results and conclusions. The theoretical and practical rationale for scientific activity in physical education and sports universities indicates the need to develop criteria for improving human resources, laboratory facilities, improving educational programmes for training scientific and teaching staff, and increasing the publication activity of specialists in the identified main areas, are an indicator of the demand for scientific research results in the practical work of experts in the industry under consideration.

Keywords: *education, physical education and sports industry, criteria for human resources potential, scientific and teaching staff, scientific work.*

Introduction. The National Doctrine of Education in the Russian Federation is a fundamental document that establishes the priority of education in state policy and serves as the basis for the development and improvement of various regulatory and legal acts. Currently, the state is in particular need of highly qualified specialists capable of continuous professional growth and professional mobility in the context of the widespread informatisation of society and the development of new technologies [2, 5].

This approach determines the need to set increasingly higher requirements for the quality of training of highly qualified scientific personnel (candidates and doctors of science) in all fields of knowledge [1, 4, 7].

The prerequisites for the steady development of pedagogical research in physical culture and sport are both the relevant ideas of previous years, which affirm the possibility of effective personality formation through motor activity, the dialectical impact of physical exercise and sport on enhancing a person's moral potential and maintaining their health, as well as modern research aimed at refining and supplementing the materials already obtained, describing and refining the results based on the use of the latest equipment [3, 6].

In this regard, it can be assumed that the most successful training of highly qualified scientific personnel is only possible through the integration of science and education in university educational complexes, which allow for the development and implementation of advanced research technologies based on interdisciplinary studies.

The training of postgraduate and doctoral students in the main scientific specialities in the field of physical culture and sport involves the mastery of modern means and methods of research activity, the implementation of progressive professional and personal self-education, and the design of a basic and comprehensive educational and scientific path in a professional career [8].

It should be noted that physical culture and sport are officially recognised as an economic sector, and the modern economy is impossible without science, so sport and physical culture are studied as a sphere of the most important production of health, entertainment and competitive services, as an important means of comprehensive education of the younger generation [2, 6, 7].

Postgraduate students must know how to conduct pedagogical research, how to determine the sequence of its stages, how to establish its quality, and much more. Solving this complex theoretical and methodological function requires the application of criteria for assessing the quality of dissertation research, knowledge of the basics of the constantly improving literary and graphic design of scientific works and the apparatus of mathematical and statistical processing of a significant amount of factual data, and most importantly, scientific schools at universities where young researchers obtain high-quality knowledge.

Objective of the study is to analyse and substantiate the conceptual blocks of scientific activity in the training of highly qualified personnel in higher physical education and sports education.

Methods and structure of the study. Scientific activity in higher educational institutions specialising in physical education and sports, first and foremost, solves the tasks of effectively training highly qualified scientific and pedagogical personnel who are capable of obtaining a product that is in demand for the practical activities of coaches, specialists and the industry as a whole. This goal can only be achieved with highly qualified and competent staff in higher education institutions, as well as laboratories with modern equipment, relevant and in-demand professional training programmes, and, most importantly, the opportunity to publish research results for a wide range of readers and specialists in Web of Science, Scopus, and VAK (Higher Attestation Commission).

Results of the study and discussion. As part of a consistent comparative analysis of both traditional and innovative scientific concepts in the search for an effective system for structuring basic scientific research in higher education, a systematisation of science and scientific research within the framework of a sports university was proposed (Figure 1).

At the same time, summarising the numerous results of many years of theoretical and scientific research, it is worth noting that the key aspects of the development of scientific activity in physical education and sports educational institutions are the following necessary conditions for the training of highly qualified personnel (Figure 2).

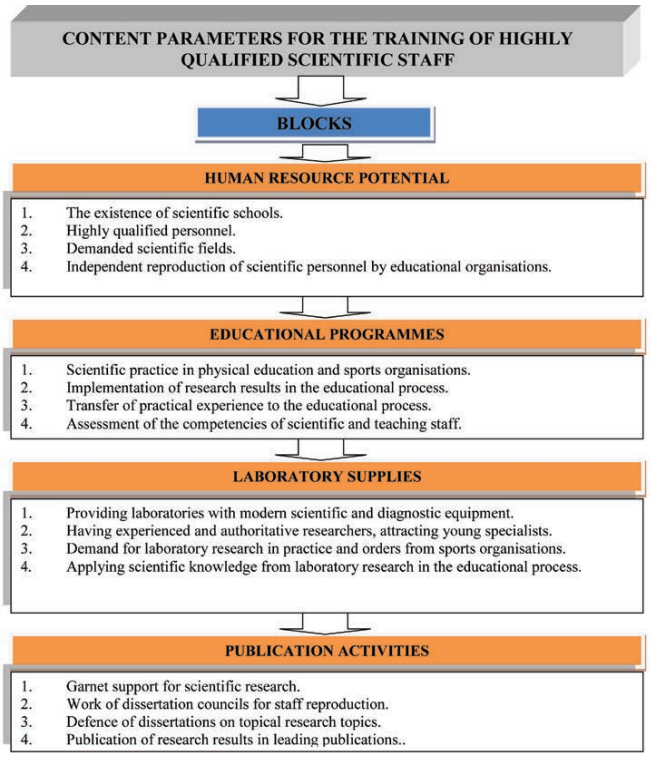

Figure 1. Conceptual blocks of scientific activity in the training of highly qualified personnel in physical education and sports education

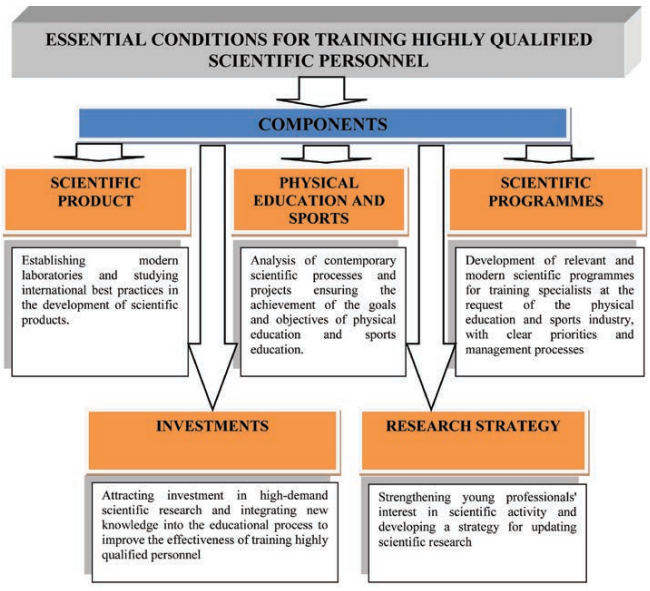

Figure 2. Conceptual components of the main conditions for training highly qualified personnel in physical education and sports education

Longitudinal studies on the effectiveness of scientific research and its integration into the practice of specialists indicate the need to summarise the results of the work in the form of a dissertation or scientific monograph with an extensive list of literature data examining the problem from all sides, thereby significantly increasing the effectiveness of the measurements carried out.

Conclusions. An analysis of dissertations in the field of physical culture and sport indicates a growing trend towards the most relevant research being conducted in pedagogical specialities. 5.8.4. Physical culture and professional physical training, 5.8.5. Theory and methodology of sport, and 5.8.7. Methodology and technology of professional education. First of all, there are three main areas: a) training and performance of the sports reserve; b) issues related to higher sportsmanship; c) a trend towards the development of new innovative technologies to attract larger groups to physical education and sports, raising the popularity of classes and knowledge, without forgetting the educational effect of all scientific work during this process.

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Interactive technologies as a means of pedagogical training for future physical education teachers

UDC 37.02

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Received by the editorial office on 07.07.2025

Abstract

Objective of the study is to develop professional competencies in future physical education teachers through digital educational content and interactive technologies.

Methods and structure of the study. The databases 'Practical Training in Pedagogy: Didactics' and 'Practical Training in Pedagogy: Theory and Methods of Education' served as educational content for the development of practice-oriented case studies. Immersion in the interactive environment was achieved through group defence of the completed case studies. The research base was the I.A. Bunin Yelets State University (Lipetsk Oblast).

Results and conclusions. Diagnostic work was carried out in the discipline of 'Pedagogy.' According to the results, the majority (44%) of students are at an average level of professional competence. During interactive problem-solving and group case studies, future physical education teachers master the solution of pedagogical-type tasks in their professional activities.

Keywords: *physical education teacher, interactive technologies, pedagogical training.*

Introduction. Modern education in Russia cannot be imagined without the introduction of new educational technologies, including interactive and digital ones, into the learning process. Research on the effectiveness of conditions created in universities for the application of modern interactive technologies is being conducted by foreign and domestic scientists [1, 2, 6, 7, 13].

We consider the practical training of future specialists to be a form of educational activity 'in which students perform certain types of work related to their future professional activities and aimed at forming, consolidating, and developing practical skills and competencies in line with the relevant educational programme.'

In our opinion, the effective condition for ensuring the practical training of future teachers is the active use of interactive technologies in the educational process.

According to V.K. Dyachenko, interactive learning is a method of cognition based on dialogue-based forms of interaction between participants in the educational process, as a result of which students develop teamwork skills and a dynamic is created in which 'everyone teaches everyone, and everyone teaches everyone' [4].

The introduction of interactive technologies into the training of specialists frees the teacher from reproductive functions, but actualises creative ones, changes the role of the teacher, and expands the possibilities for managing the cognitive activity of students. Figure 1 shows our proposed algorithm for the formation of professional competencies of future teachers based on the use of interactive technologies.

A necessary condition for the formation of professional competencies of future teachers is meaningful goal setting, perception of information, and designing options for solving professional tasks of future pedagogical activity while immersed in an interactive learning environment.

In modern educational practice in a digital society, interactive learning is closely linked to the use of in-

formation technologies, the research and implementation of which continues in a number of areas: development and application in the educational process; development of information and communication technologies [1, 3, 5, 8, 9, 11].

Objective of the study is to develop professional competencies in future physical education teachers through digital educational content and interactive technologies.

Methods and structure of the study. The research base is the Federal State Budgetary Educational Institution of Higher Education 'Yelets State University named after I.A. Bunin' (Lipetsk Oblast). Twenty-five people participated in the experimental group – students majoring in 44.03.05 Pedagogical Education (with two specialisations), specialisation (profile) Physical Culture, Additional Education (sports training).

The professional competence to be developed was selected from the main educational programme of the university for this profile, PKS-1, which is capable of teaching the subject based on the use of subject-specific methods and modern educational technologies that ensure the achievement of meta-subject, subject-specific and personal results.

The indicators of competence achievement, reflecting general pedagogical training, are presented as follows: know – the characteristics of personal, meta-subject and subject results of students in the context of physical education (in accordance with the Federal State Educational Standards and the approximate curriculum), methods of control, assessment and correction of learning outcomes; be able to – design a working programme for the discipline, design and implement various forms of teaching and organisation of extracurricular activities for students in physical education, ensuring the achievement of meta-subject, subject and personal results; be proficient in modern educational technologies that ensure the achievement of meta-subject, subject and personal results of students, methods of monitoring, assessment and correction of learning outcomes.

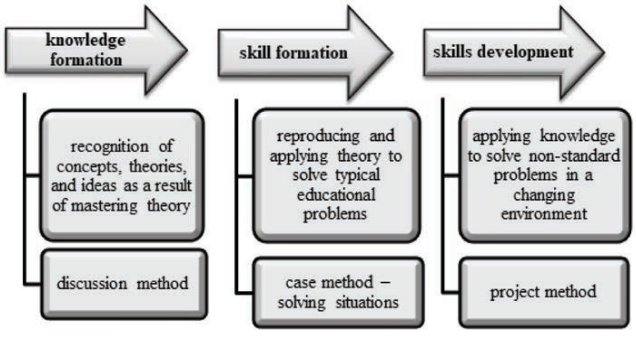

Figure 1. Algorithm for developing the professional competencies of future teachers based on the use of interactive technologies

The databases 'Practical Training in Pedagogy: Didactics' and 'Practical Training in Pedagogy: Theory and Methods of Education' served as educational content for the formation of individual practice-oriented cases requiring solutions (OIS registration certificates No. 2022620972 and No. 2023621215, respectively). Here is an example of a case: Based on the text of the Federal State Educational Standards (clause 10, section II), visualise the requirements for meta-subject learning outcomes in physical education. The result of the case study solution could be a sketch of a stand, an organisational chart, a fragment of a working programme for the discipline, etc. Immersion in the interactive environment was achieved through group defence of the solved case studies.

Results of the study and discussion. Assessment materials for this competency in the subject 'Pedagogy' (4th semester of study) were used as diagnostic materials to evaluate the development of professional competence. The diagnostic work was carried out in accordance with the requirements of the Russian Accreditation Agency for diagnostic work during state accreditation. The 'satisfactory' grade received by future physical education teachers for completing the diagnostic work was classified by us as a low level of competence development, "good" as average, and 'excellent' as high. The results obtained are presented below (Figure 2).

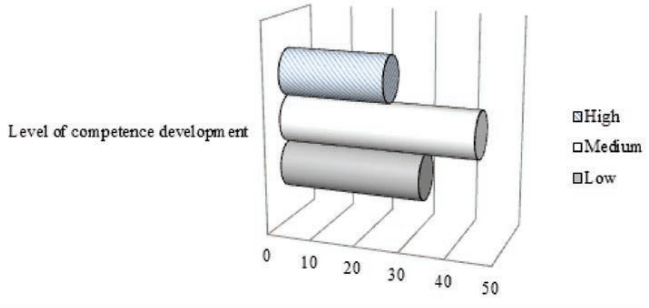

Figure 2. Assessment of PCS-1 formation: level aspect (%, sample p = 25)

In our opinion, the results obtained correspond to the logic of professional competence formation throughout the entire training process. Most students are at an intermediate level of PKS-1 development.

Further assimilation of methodological knowledge in senior courses and industrial practice will enable future teachers to master professional competencies at a high level, which corresponds to the transition from the zone of proximal development to the zone of actual professional development.

During interactive problem solving and group case studies, students master the pedagogical tasks of their future professional activities: they learn about regulatory and legal acts in the field of education and professional ethics; they gain initial experience in developing elements of basic and additional educational programmes; they design possible joint and individual educational and training activities for students; master the skills of control and evaluation activities, etc.

Conclusions. The didactic essence of interactive technologies used in the educational process of a university lies in the creation of organisational and managerial information support for the educational process, including innovative methods, forms of organisation of educational activities and control of their results.

The system of didactic conditions that ensure the effective use of interactive technologies in the training of future physical education teachers includes the creation of conditions that allow for the organisation of: the recognition of concepts, theories, and ideas as a result of mastering theory, the reproduction and application of theory to solve typical educational problems, and the application of knowledge to solve non-standard problems in a changing environment.

A learning model based on interactive technologies in an electronic information and communication environment provides an opportunity to integrate students' independent cognitive activity with a variety of information sources and specially designed teaching materials, ensuring prompt and systematic interaction with teachers and fellow students, as well as promoting effective collaborative learning using a wide variety of problem-based and research-based teaching methods in the course modules.

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Scientific and pedagogical research in the field of theory and practice of professionally-oriented physical culture in higher education institutions of the Ministry of Internal Affairs of Russia

UDC 37.046:001.08

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Received by the editorial office on 08.07.2025

Abstract

Objective of the study is to provide scientific and theoretical justification for the use of sports-oriented technologies in the practice of professionally-oriented physical education for cadets at Russian Ministry of Internal Affairs universities.

Methods and structure of the study. Analysis and summarisation of scientific and methodological literature; synthesis of practical experience through interviews with veterans of the Ministry of Internal Affairs operational work, leading coaches and athletes, as well as viewing video recordings of operational and competitive activities; pedagogical observations and testing.

Results and conclusions. The author's interpretation sets out the provisions of a sports-based approach to the physical training of future police officers as arguments for the necessity and relevance of scientific and pedagogical research on the development of the theory and practice of domestic professionally-oriented physical culture. Important aspects of the use of sports-oriented technologies in educational organisations are noted: integrated training, the formation of motivation for the growth of professional skills, the conversion of the components of sports training, individualisation and a personality-oriented approach.

Keywords: *Russian Ministry of Internal Affairs, physical education, sport, cadet, professionally-oriented training.*

Introduction. Recent scientific studies on the process of professionally-oriented physical training in Russian police academies have shown that modern methods need to be updated, and a whole range of contradictions can be identified here [2, 3, 4, 6].

At present, it is extremely important to analyse and synthesise both all methodologies and methods, as well as the very objectives of professionally-oriented physical training. A completely new theory and practice is needed that responds to the realities of today.

Consequently, it is necessary to change both the target objective itself and all components of the didactic process. At present, it is desirable to 'sportify' the physical training process, which is possible by restructuring the content and target objectives of classes from general physical training to a pedagogical system of sports training.

Objective of the study is to provide scientific and theoretical justification for the use of sports-oriented technologies in the practice of professionally-oriented physical education for cadets at Russian Ministry of Internal Affairs universities.

Methods and structure of the study. Analysis and summarisation of scientific and methodological literature; synthesis of practical experience through interviews with veterans of the Ministry of Internal Affairs operational system, leading coaches and athletes, as well as viewing video recordings of operational and competitive activities; pedagogical observations and testing.

Results of the study and discussion. Physical education and sports training clearly indicate that their common unifying essence is sports culture, as an integral, albeit rather specific, part of the general cultural potential of the entire human society [1].

The scientific basis for the phenomenon of sports culture is revealed in the research of Russian professor L.I. Lubysheva [7]. From the scientist's point of view, sports culture is part of the general culture, uniting categories, patterns, as well as institutions and benefits created for the intensive use of physical exercise in competitive activities.

In cultural terms, in order to achieve high sporting results, motor activity involves the use of innovative sports technologies, for which the creative qualities of those involved are in demand. The vector of creativity is directly proportional to the social prerogatives of society. The intellectual, structural and spiritual components of any creative initiative are determined by the value-criteria section of a person's self-awareness.

For example, achieving a high level in Eastern martial arts can be a goal of self-improvement, or it can become a weapon for a criminal. The focus and indicators of creative activity must be based on the fundamental principles of universal human values. In the case of cadets at Russian departmental universities, these are the concepts of the so-called military morality of a Russian officer.

Thus, for the effective formation of applied skills and the education of the personality of cadets at Russian police training institutions, professionally-oriented physical training can be carried out on the basis of a creative-oriented sports-based approach and include the following aspects:

1) ***Integral training.*** 'In high-performance sports, pedagogical excellence is determined by the harmonious interconnection of skills and qualities. This multifaceted didactic task is solved primarily through integral training, a term introduced by N.G. Ozolin' [5, p. 15]. In addition to physical (speed-strength endurance, starting 'explosive' speed or impulse speed), coordination qualities of the body's sensory systems (visual, verbal, tonal and muscular sensitivity), special (active) flexibility and motor skills (technique of performing hand-to-hand combat moves), there are also a number of quite specific and even creative components:

- tactical training (operational-tactical intelligence) is the development and improvement of special skills for the operational, rational and adequate use of motor action techniques in a given tactical situation.

- psychological training is the formation and improvement of specific qualities that enable the most positive application of technical and tactical skills and physical qualities, which, in turn, involves the development of stress resistance, patience, fearlessness, leadership qualities, etc.

- moral improvement – the cultivation of moral qualities that form the basis for the humanistic improvement of human society (compassion, justice, patriotism, etc.).

- cultivation of an acmeological, axiological, and synergistic worldview (striving for perfection, creativity, focus on the individual, sense of beauty).

Due to the fact that sports culture is not only a scientifically based methodology but also an art, hand-to-hand combat training creates favourable conditions for acmeological education when the educational process is competently organised. Although this conclusion is often difficult to accept, it is nevertheless true. It is no coincidence that Far Eastern martial arts have another name – 'combat arts'.

2) ***Developing motivation to improve professional skills.*** "As a psychophysiological quality, motivation is a dominant component of the learning process. Like a goal, a motive is a powerful psychological aspect that stimulates activity.

The energising power of motivation is determined by its effect on volitional qualities. In turn, volition is an active component of intelligence and morality that controls actions and deeds. The controlling power of motivation is determined by its stimulating effect, which helps and motivates intellectual, moral, psychological and physiological efforts related to the pursuit of goals [8, p. 387].

3) ***Conversion of the components of sports training.*** In the 1990s, Russian researchers began to develop a scientific concept of an innovative theory of physical culture in the projections of pedagogical technologies for sports training. These scientific developments determine the conversion of the didactic components of sports training into the educational process of educational organisations.

4) ***Individualisation and a personality-oriented approach.*** Professor D.V. Syshko notes that "personality-oriented systems and technologies are quite effective in the educational process, including in the professional and applied hand-to-hand combat training of cadets at higher education institutions of the Russian Ministry of Internal Affairs. All pedagogical systems and technologies used in the educational process of modern youth should be oriented towards meeting the highest level of needs, towards creating a personal philosophy of both the learner and the teacher. The priorities of education should be to work

on the personality and the high level of individual development of each young person. This proves the urgent need to 'sportify' the entire educational process of hand-to-hand combat training in Russian higher police schools [9, p. 260].

Conclusions. The above provisions serve as arguments for the necessity and relevance of scientific and pedagogical research on the development of the theory and practice of domestic professionally-oriented physical culture as a component of the training of future police officers through sports, integration, individualisation and, ultimately, motivation.

In this regard, the relevance of developing new methodologies for building the entire pedagogical process, focused on the formation and preservation of special skills and qualities, is beyond doubt, since the existing professional training in educational institutions of the Ministry of Internal Affairs no longer fully meets the current requirements for Russian police officers.

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