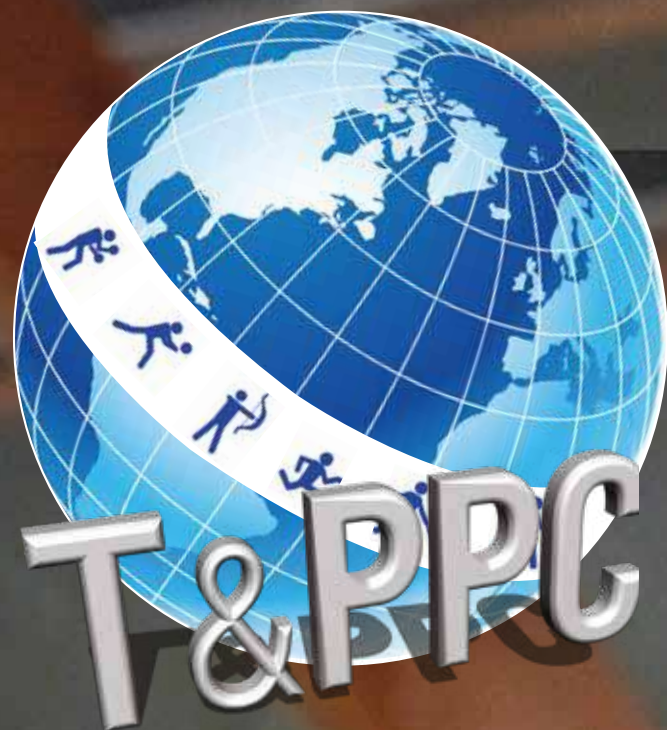




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Theory and Practice
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Substantiation of the technology for integrating the physical and technical preparation of swimmers aged 11–14 years

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Abstract

Objective of the study is to substantiate the technology for integrating the physical and technical preparation of swimmers aged 11–14 years.

Methods and structure of the study. The scientific work used the analysis of literature data; various approaches to the development of physical qualities and technical preparedness were studied; the results of the authors' own long-term observations, conducted on a contingent of 124 swimmers aged 11–14 years, were generalized. The study included the application of methods of computer video analysis, testing, hardware diagnostics (Swim Force Test, VASA Swim Ergometer), design, modeling, as well as methods of mathematical statistics. The data processing was carried out using correlation, regression, and ROC analysis.

Results and conclusions. The following components of the technology for integrating the physical and technical preparation of swimmers are proposed: conceptual, content-related, and procedural, based on the principles of level-based continuity, integrative systematicity, complementarity, and synergism. The application of special methods (conjugation, level-based construction, technique stabilization, complementation of means, stress impacts) and selected exercises, including those on simulators, makes it possible to ensure the conjugated development of physical qualities and swimming technique, creating conditions for the effective transfer of fitness into the structure of the competitive action.

Keywords: *integration, technology, physical and technical preparation, synergism, young swimmers, conjugated methods and means of training, principles.*

Introduction. The training stage in the age range of 11–14 years is a critical link in the system of long-term preparation of swimmers. It is precisely during this period that the active formation of the motor skill occurs, an individual swimming style is formed, and the morphofunctional restructurings associated with pubertal development create favorable prerequisites for the growth of special working capacity. However, as practice shows and the data of scientific studies confirm, it is precisely at this stage that the contradiction between the development of physical qualities and the effectiveness of their realization in the structure of the stroke is manifested most acutely. The problem of the dissociation of physical and technical preparation has repeatedly become the subject of study in the works of leading specialists [1, 2, 5, 7, 8]. V.N. Platonov em-

phasized that the effective transfer of fitness is possible only under the condition of the biomechanical and physiological correspondence of the means of special physical preparation to the structure of the competitive exercise [5]. T.G. Fomichenko pointed out the need to divide strength preparation into general and special, with the latter to be carried out in conditions as close as possible to swimming [7]. And V.B. Avdienko and I.N. Solopov focus attention on the fact that strength developed in isolated conditions on land requires special "hydrodynamic tuning" for its realization in the stroke [1].

In the works of A.V. Arishin and A.I. Pogrebnoy, the need to revise the traditional approaches to the construction of the training process at the stages of long-term preparation is substantiated. The authors iden-



tified the key biomechanical parameters limiting the swimming speed in the 11–14 age group, and showed that the isolated development of physical qualities does not lead to an automatic improvement of technique [3, 4, 6]. A number of studies revealed that, with the traditional planning of the training process in swimmers aged 11–14 years, a multidirectional dynamics of the kinematic parameters of the stroke is observed, in which positive changes in some phases are accompanied by the degradation of others, which testifies to a violation of the established biomechanical structure [2, 3].

Of particular importance for our study are the works of recent years, in which it has been established that, under the condition of the synergetic interaction of the means of physical and technical preparation, an emergent effect arises, as a result of which a qualitative leap in the level of integral technical-physical preparedness is achieved. In our works of 2024–2025, these provisions received further development with regard to the 11–14 age group, where pubertal changes create both favorable prerequisites for the growth of special working capacity and risks of the formation of irrational technique [2, 3].

Thus, the analysis of the scientific literature and the generalization of the results of the authors' own long-term observations unambiguously indicate the need to develop a specialized pedagogical technology that would make it possible to overcome the existing fragmentation and to ensure the integration of the physical and technical components in a unified training process.

Objective of the study is to substantiate the technology of the integral physical and technical preparation of swimmers aged 11–14 years.

Methods and structure of the study. The scientific work used the analysis of literature data; various approaches to the development of physical qualities and technical preparedness were studied; the results of the authors' own long-term observations, conducted on a contingent of 124 swimmers aged 11–14 years, were generalized. The study included the application of methods of computer video analysis, testing, hardware diagnostics (Swim Force Test, VASA Swim Ergometer), design, modeling, as well as methods of mathematical statistics. The data processing was carried out using correlation, regression, and ROC analysis.

Results of the study and discussion. The proposed pedagogical technology of integral physical and

technical preparation represents a part of the pedagogical system and includes three obligatory components – conceptual, content-related, and procedural, each of which makes its contribution to achieving the final goal, which consists in achieving the maximum swimming speed in the structure of the competitive exercise.

The conceptual component of the technology is based on the theory of synergism and systematicity, which makes it possible to rethink the traditional approaches to the preparation of swimmers. At the basis of the proposed concept lies the provision that the training process should be built not as a sum of isolated impacts on physical qualities and technique, but as an integral system, where the means of preparation are selected taking into account their mutual reinforcement [2]. The key notion here is the principle of level-based continuity, which presupposes that the means of long-term preparation used are not simply summed up, but reinforce the effect of the previously applied approaches. This becomes possible when the pedagogical impacts correspond to the anatomical and physiological features of the athletes at each age stage, to their genetic and phenotypic sensitivity. The load in this technology is considered as an instrument of synergism, when the orientation of one work complementarily supplements and reinforces the effect of another. The principle of complementarity consists in the use of interdependent training means at various levels of functional load. Each new level of preparedness is thereby defined as a new, “zero” level, since, from the standpoint of the theory of the self-organization of systems, there is no way back, and development proceeds along a spiral-shaped trajectory [2, 3].

Of fundamental importance for the technology is the identification of the principle of integrative systematicity, which can be formulated as “technique is greater than the sum of the technical elements composing it.” This means that the interaction of the means of physical and technical preparation generates a systemic effect (emergence), expressed in the appearance of new levels of preparedness, unattainable with the isolated use of these means [2].

The content-related component of the technology includes a system of pedagogical tasks, distributed by the years of preparation, and special training methods ensuring their solution. At the basis of constructing the content are the results of the ROC analysis, which revealed the dominant, highly specific parameters in-



fluencing the maximum swimming speed in the 11–14 age group [2, 3].

To realize the set tasks, the technology proposes using five special methods of sports training [2]. The method of conjugation consists in the selection and use of means from the arsenal of physical and technical preparation, making it possible to harmonize the simultaneous impact on the indicators of both types of preparedness. The application of this method finds its expression in the synchronization of training tasks on land and in the water, united by a single biomechanical structure and the same zone of intensity. The method of level-based construction implies the choice of a certain training pattern after passing the bifurcation point, taking into account the already achieved level of preparedness, which makes it possible to create conditions for controlled, systemic planning with a calculated target effect. The method of technique stabilization presupposes the performance of exercises at various levels of load – aerobic, threshold, and anaerobic-glycolytic – with control of the stability of technique at each level. If the element being corrected is not stabilized, a return to a lower level is provided for the introduction of additional conjugated means. The method of complementation of means consists in the application of highly specific exercises on land and in the water, aimed at achieving a high swimming speed, with the combining of these means taking into account the priority of the training tasks. The method of stress impacts is characterized by the inclusion in the training programs of random non-specific exercises that have no direct relation to the general algorithm of the task being solved, which serves as a stimulus for the further development of the system, bringing it out of the state of stagnation.

The procedural component of the technology determines the order of the organization of the training process in various structural formations – macro-, meso-, and microcycles. At the basis of the procedural component lies the idea of concentrating loads of a certain predominant orientation at a limited stage and of separating in time the loads with a different orientation of the training impacts. This ensures the possibility of a massed specialized impact and the achievement of a stable adaptation effect. The distribution of loads by zones of intensity is carried out taking into account the tasks of each stage of preparation. In the annual cycle, consisting of several macrocycles, the ratio of loads of various orientations varies: from predominantly aerobic in the preparatory periods to anaero-

bic-glycolytic and lactate in the pre-competition and competition periods.

In the mesocycles of preparation, the distribution of the intensity of tasks is planned on the basis of the tasks of the cycle. In the basic mesocycles associated with the transition to aerobic-strength loads, the methods of technique stabilization and conjugated impact are predominantly recommended. In the shock microcycles of an integrative orientation, the main volume of work falls on the zones of high intensity, which makes it possible to create a powerful training stimulus. Such microcycles include both morning and evening training sessions, ensuring the accumulation of the training effect. Of particular significance in the procedural component is the organization of an individual training session, which is divided into two parts – in the gym and in the water. The preparatory part includes exercises for flexibility and the imitation of arm work on land, as well as swimming in recovery zones. The main part contains several tasks, a significant part of which is conjugated. In the gym, on specialized simulators, movements imitating the stroke are performed, with an emphasis on increasing power in the propulsive phases. In the water, analogous tasks are simultaneously solved with the use of additional equipment (paddles of various areas, drag belts, snorkels) and without it. Such a construction of the session makes it possible to solve the tasks of increasing power in the propulsive phases of the stroke and at the same time to maintain the stability of technique against the background of pronounced fatigue.

For the realization of the procedural component of the technology, a wide arsenal of simulator complexes and auxiliary means is recommended. On land, specialized ergometers and simulators are applicable, making it possible to model the biomechanical structure of the stroke in conditions close to competitive ones. In the water – the use of paddles of various areas, variants of coordinating the stroke movements with various intensity and weights, as well as their combinations. The selection of means is carried out taking into account the parameters of the power of movements during the imitation of the stroke on land and the power of the stroke in the water, as well as taking into account the features of the kinematic structure of the stroke, which ensures their biomechanical correspondence.

Conclusions. The technology of integrating the physical and technical preparation of swimmers aged



11–14 years presented in the work is a natural result of the generalization of theoretical provisions and the results of the authors' own long-term studies. It is based on the conceptual principles of synergism, level-based continuity, integrative systematicity, and complementarity, which makes it possible to consider the preparation of a swimmer as an open self-organizing system. The key feature of the technology lies in the fact that it does not presuppose the simple summation of the means of physical and technical preparation, but creates conditions for their mutual reinforcement. The conjugated use of exercises on land and in the water, united by a single task, a similar kinematic structure, and the same zone of intensity, makes it possible not only to develop the necessary physical qualities, but also to simultaneously improve technique in conditions as close as possible to competitive activity. This ensures the creation of the necessary conditions for the successful transition of swimmers to the subsequent stages of long-term preparation and the achievement of high sports results.

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Application of the systematization and control program module in the educational process of universities

UDC 371.134



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Abstract

Objective of the study is substantiation and integration of the program module for systematization and objective assessment of the level of physical training of students of higher educational institutions in the educational process.

Methods and structure of the study. To achieve the set goals, the following methods were used: analysis of scientific literature, collection of empirical data, conducting questionnaires, and mathematical processing of the obtained results. The study of regulatory legal acts revealed the need for the introduction of innovative educational technologies. During the questionnaire, it was found that the software module for the systematization and control of physical training is in demand among students and contributes to increasing their motivation for classes.

Results and conclusions. The developed software module, which focuses on systematizing and monitoring the physical training of university students, is an innovative tool aimed at optimizing their physical capabilities and improving the quality of the educational process.

Keywords: *software module, methodological instructions, physical education, academic course, education, level of physical training, certification.*

Introduction. As part of higher education, the Physical Education course concludes with an intermediate assessment in the form of a credit. The credit assessment is differentiated and includes points for attendance, theoretical knowledge, and practical training. Theoretical knowledge is assessed through testing, which can be conducted both in-person and remotely, depending on the credit program, the institution's facilities, and requirements. In practice, students generally perform well on the tests and demonstrate high results. Physical education classes are held once a week during the semester, and the number of practical classes does not exceed twenty. Despite the high workload of students and absences due to various reasons, including illness, they easily achieve attendance points. However, 40% of students, especially first-year students, face difficulties in completing the physical exercises that are part of the course requirements. These exercises are designed to as-

sess the development of physical qualities such as strength, speed, and endurance. Since most students have either never taken part in sports or have stopped training in the past, it is difficult for them to achieve high results in these exercises. The development of students' physical qualities is a priority for the departments of physical education. However, with an average attendance rate of 35-40%, especially in the third year, it is difficult to talk about significant progress in this area. Mainly, efforts are focused on maintaining the physical condition necessary for the implementation of educational tasks. Students have different weight-height parameters and body mass indices, but the scores for the exercises in the test are averaged for all. The physical education curricula include several sections covering exercises from various sports. However, it is not possible to regularly practice these exercises in class due to the need to cover all sections of the curriculum. The federal state educational stand-

ards for bachelor's degrees require graduates to have the skills to organize independent physical training. However, students often lack the knowledge and skills to develop their physical abilities. Therefore, it is necessary to develop guidelines for students to help them develop their physical abilities through independent training.

The relevance of research is underscored by the imperative to formulate a comprehensive methodological framework for independent physical training, which is designed to optimize the physical parameters of student populations; this endeavor is particularly significant in the context of modern educational paradigms, where holistic development is increasingly recognized as a crucial component of academic success.

Objective of the study is substantiation and integration of the program module for systematization and objective assessment of the level of physical training of students of higher educational institutions in the educational process.

Subject of research: electronic educational platforms in higher education institutions.

Methods and structure of the study. The organization of research activities was carried out in two stages, each of which was aimed at achieving specific goals and objectives.

In the first stage, the needs of students for methodological recommendations on the development of physical qualities during independent physical training were analyzed. The goal of this stage was to identify the most effective formats for providing recommendations that would be most adaptable and convenient for students.

In the second stage, methodological recommendations for students were developed based on the data obtained during the first stage of the research. This stage involved a thorough analysis of the content and structure of the recommendations, taking into account the specific needs of the target audience and the requirements for their practical implementation.

Before developing the guidelines, it is necessary to conduct a thorough analysis of the target audience's need for this product. To achieve this, a questionnaire was conducted, in which more than a hundred second- and third-year students participated. The data obtained, as shown in Figure 1, allowed us to assess the students' level of interest in using the guidelines being developed.

Will you use methodological recommendations to develop your physical qualities?

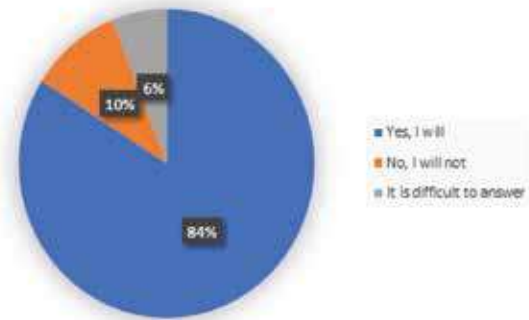


Figure 1. Students' assessment of the feasibility of developing guidelines for the development of physical qualities

The results of the survey demonstrate that the vast majority of students (84%) express a need for methodological recommendations for developing physical qualities through independent physical education classes. This highlights the importance of developing and implementing effective methodological materials aimed at optimizing students' physical training.

To determine the most preferred format of methodological recommendations, students were asked the following question: "Which format of recommendations is most convenient for use in the educational process: electronic or printed?" An analysis of the survey results, presented in Figure 2, suggests that an electronic software product is the most preferred option for methodological recommendations for students engaged in the development of physical qualities. This result highlights the need for the development and implementation of innovative digital solutions that enhance the effectiveness of the educational process and individualize approaches to physical training for students.

Research of the factors that influenced the results of the survey:

- The most difficult aspect of assessing the credit for the discipline "Physical Education" for most students is the quantitative and qualitative assessment of their level of practical preparedness, which is determined by the performance of exercises aimed at developing key physical qualities;
- Students strive to obtain the credit within the established deadlines in order to minimize academic debts, which helps to avoid the time spent on resolving them in subsequent academic periods;

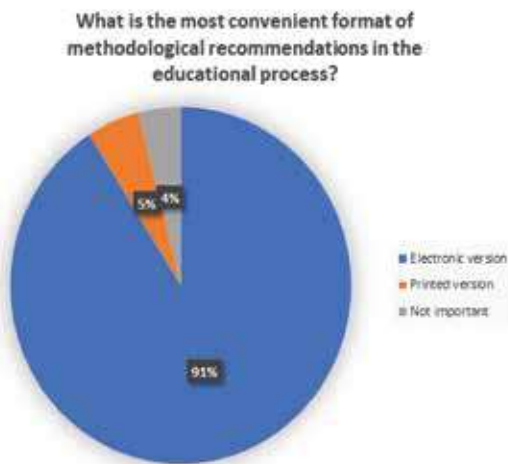


Figure 2. Students' definition of the format of methodological recommendations for the development of physical qualities

- In the context of the lack of specialized knowledge about methodological approaches to the development of physical qualities, there is an urgent need to develop and implement methodological recommendations aimed at optimizing the process of independent training.

- In the context of modern educational trends, students, as representatives of young people, demonstrate a clear preference for using electronic educational systems, which is due to their high adaptability to technological innovations and integration with global information networks [3];

- The introduction of advanced technological solutions significantly activates cognitive processes, stimulating students to innovative thinking and in-depth knowledge of the subject area [1].

In the modern educational paradigm, there is a tendency towards the integration of innovative information technologies into the pedagogical process. This is due to the need not only to effectively assimilate educational material, but also to create conditions for maximum student engagement and motivation. With the rapid development of the digital environment and the digitalization of all aspects of society, the introduction of interactive and multimedia resources has become an integral part of modern didactics. The use of information and communication technologies in the educational process helps students develop critical thinking, self-learning skills, and a creative approach to problem-solving. This, in turn, increases their competitiveness in the labor market and contributes to successful adaptation to the dynamically changing conditions of professional activity [2]. Information

retrieval systems act as a key tool, providing educational participants with access to extensive learning resources and enabling effective self-learning. These systems transform traditional approaches to learning, becoming an integral part of a guided learning process that is purposefully adapted to the individual needs and cognitive capabilities of learners. As a result of their application, not only the development of professional competencies is observed, but also the formation and improvement of students' personal qualities, which contributes to their comprehensive personal and professional growth.

Results of the study and discussion. The research conducted as part of this work served as a key impetus for the development of specialized software – a module for systematization and control of the level of physical fitness of students. This module is a system that integrates methodological recommendations for the development of physical qualities based on an objective assessment of the user's current state. The module's functioning is based on a sequence of algorithmic operations that include arithmetic, logical, and other computational processes. These operations not only determine the user's initial level of physical fitness but also provide personalized recommendations for improving it, facilitating a more effective and targeted physical training process for students.

1. Introduction of personal data. During the system initialization process, the user enters their personal data, including their last name, first name, patronymic, and age, for correct identification and subsequent analysis.

2. Analysis of weight and height characteristics. The program automatically calculates the body mass index (or BMI) based on the user's entered weight and height data. The results are displayed as a numerical BMI value and a qualitative weight classification: overweight, normal, or underweight. For example, an BMI of 21.34 indicates a normal weight.

3. Registration of initial indicators of physical fitness. The user enters the initial results of exercises for various physical qualities (strength, speed, endurance, and flexibility), allowing to assess his current level of physical fitness.

4. Evaluation and analysis of physical fitness. The program analyzes the entered results using the criteria established by the fund of assessment tools. Based on this analysis, the system provides a comprehensive assessment of the level of development of each physical quality, as well as identifies the strengths and



weaknesses of the user's physical fitness. In the case where the physical quality is rated below four points, the program recommends specific exercises for its development, including text instructions, video materials from the training program and videos from the Internet.

5. Recommendations for weight correction. Regardless of the level of physical fitness, the program provides individual recommendations for the choice of physical exercises aimed at correcting body weight. Recommendations depend on the value of the user's body mass index and may include both exercises for weight loss and for weight gain.

6. Development of a general exercise program. The system generates recommendations for performing general exercises that can be effectively performed on-site, which helps to improve overall physical fitness and prepare for more intense training sessions.

The software module should be integrated into the website of the University Department of Physical Education and into the distance learning system of the higher educational institution, ensuring its accessibility for all students. This module is designed to monitor the level of physical fitness of students and systematize the results obtained, which contributes to an objective analysis of the dynamics of their physical development and the optimization of educational programs in the field of physical education.

Conclusions. Electronic educational systems play a key role in implementing the concept of advanced learning, which is focused on the predicted future development of science and professional practice for graduates of higher educational institutions. In today's conditions, the educational process at a university should not only record current achievements, but

also actively consider the prospects of scientific and technological progress, as well as the trends of digitalization of society and the educational environment. The software module for systematizing and monitoring the level of physical fitness of students, which is integrated into educational systems, should not only contribute to the development of physical qualities, but also help students acquire the skills of independent physical training. This should lead to an increase in the effectiveness of intermediate and final physical training assessments. Thus, the introduction of such software modules into the educational process is an important step towards creating a more flexible and adaptive educational environment that can effectively respond to modern challenges and provide training for future-ready professionals.

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Analysis of the effectiveness of performing technical actions to control the special training of arm-wrestler athletes

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Abstract

Objective of the study is to identify the relationships between the indicators of activity, efficiency, effectiveness, and effective variability of the technical-tactical actions among student arm wrestlers.

Methods and structure of the study. To determine the parameters for analyzing competitive activity, a pedagogical observation was conducted of the competitive and training process of the arm-wrestling athletes of the national team of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. Video recordings of 145 bouts held in the period from 2024 to 2025 at all-Russian and regional competitions among students were studied. The level of technical-tactical preparedness of the arm wrestlers was assessed by the effectiveness of performing technical actions, the starting position, and the attacking action. The identification of the connections between the indicators of technical-tactical preparedness was carried out using correlation analysis.

Results and conclusions. All the indicators of technical-tactical preparedness in arm wrestling were interconnected. The efficiency of performing technical actions varied depending on the presence of classification groups and successfully performed technical actions. In turn, the effective variability was connected with effectiveness (0.58) and activity (0.52). Effectiveness was also connected with activity (0.55), i.e., a change in the number of points in competitions entailed a change in the number of successful attempts to perform attacking techniques. In the course of the training process, coaches need to conduct conditioned sparring with various tactical tasks against fighters with oppositely named basic stances. It has been established that the combination of technical-tactical actions increases the volume, efficiency, and effectiveness of the technical-tactical arsenal of the athletes, giving arm-wrestling athletes a tactical advantage in conducting bouts.

Keywords: arm wrestlers, students, effective variability, efficiency, effectiveness, indicators of activity.

Introduction. The modern growth of the level of competitive struggle at arm-wrestling competitions is characterized by the complication of technical-tactical actions, primarily by an increase in the speed of attacking actions and the tactics of conducting a bout. The increase in the requirements for an athlete's preparedness and the trends of growth in physical load create conditions for the effective planning of the training process in arm wrestling, which is the key to high results at competitions [1, 6].

Arm-wrestling classes with students of non-sports universities contribute to the development of physical qualities such as strength, agility, endurance, reaction

speed, as well as moral-volitional qualities, which largely determine the preparation for future professional activity and contribute to introduction to a healthy lifestyle [11, 14]. In addition, arm wrestling is an accessible sport for a large number of students [9, 11].

Technical-tactical preparedness in many martial arts is one of the main parts of sports preparation and directly affects the result in competitions. In arm wrestling, there are methods for determining technical-tactical preparedness by various indicators and in various phases of the bout [4].

The indicators of activity, efficiency, effectiveness, and effective variability reflect different aspects of an



athlete's technical-tactical preparation and help to assess the success of actions in a bout, since they must be interconnected. These indicators give a complete picture of the merits and shortcomings in an arm wrestler's preparedness. In addition, the efficiency of performing technical actions best reflects the strength of the opponents in the bouts, which makes it possible, by selecting partners, to regulate technical-tactical preparedness [3, 10].

To determine the level of technical preparedness in arm wrestling, special scales for assessing the key elements (the starting position and the attacking actions) are used [15].

Tactical preparedness is determined in training bouts according to the coach's task. The effectiveness of the tactics is assessed by the ability to realize an advantage at the beginning of the bout or to prolong the bout [5, 12, 13].

Objective of the study is to identify the relationships between the indicators of activity, efficiency, effectiveness, and effective variability of the technical-tactical actions among student arm wrestlers.

Methods and structure of the study. The methodological basis of the study was the analysis and generalization of literary sources, pedagogical observations, video recording, shorthand records of bouts, as well as methods of mathematical statistics.

The level of technical-tactical preparedness of the arm wrestlers was assessed by the effectiveness of performing technical actions – the starting position and the attacking action.

The activity of technical-tactical actions was assessed using a statistical analysis of competitive activity by the number of successful actions (attacks for a score) and the average time spent on one attacking or defensive action (the athlete's activity in the first 30 seconds, in the main time, and in the last 10 seconds of the bout).

The efficiency of the actions was assessed using the formula:

$$\text{Efficiency} = \text{Number of successful actions} / \text{Total number of actions} \times 100\%.$$

The effectiveness of the technical actions was determined through the indicator of the total number of attacking actions during competitions. The variability of the technical-tactical actions was assessed as the degree of diversity of the variants of performing attacking actions (an attack via the "top," "hook," "push," "top roll") [7]. For this, the percentage ratio of the frequency of using a technique to the total number of used actions was applied.

The identification of the connections between the indicators of technical-tactical preparedness was carried out using correlation analysis.

To determine the parameters for analyzing competitive activity, a pedagogical observation was conducted of the competitive and training process of the arm-wrestling athletes of the national team of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. Video recordings of 145 bouts held in the period from 2024 to 2025 at all-Russian and regional competitions among students were studied.

Results of the study and discussion. A bout in arm wrestling is characterized by a high motor density of technical actions [2, 8]. The technique of conducting a bout consists of the following positions: stances (left-sided, right-sided), starting position, attack phase, realization of advantage. The starting positions of the arm-wrestling athletes were analyzed, of which about 79.3% of the athletes conducted bouts in a right-sided stance, 20.1% – in a left-sided one, and a mixed-sided stance – 0.6%. Arm wrestlers in a bout with a left-sided stance had a slight technical-tactical advantage. Thus, they finished the bout with a victory in 50.2% of the cases, compared with athletes with a right-sided stance, who had victories in 49.4% of the cases. Athletes who changed the position of the stance had only 0.4% of victories.

A feature of arm wrestling, as in many martial arts, is the possibility of combining starting positions and attacking actions. The starting position was consid-

Table 1. Indicators of technical-tactical actions in arm wrestling

Indicators	Starting position			Attacking actions			
	Right	Left	Mixed	Top	Hook	Push	Top roll
Volume, %	79.3	19.1	1.6	11.6	1.3	16.7	4.8
Efficiency, %	63.7	66.5	15.1	62.5	60.6	60.5	69.1
	48.4			62.2			
Effectiveness, points	2.4	2.8	0.5	1.1	1.1	1.4	4.8
	1.9			1.73			



ered as the position in which the athletes grip their hands, place their elbows, hand, and forearm, and also grip the table peg with the free hand. By attacking actions was understood the attack phase – to achieve an advantage over the opponent by bringing his arm to an angle of 45° relative to the surface of the table. Four variants of the attack phase were considered: top, hook, push, and top roll.

Table 1 presents the indicators of the starting positions and the variants of the attacking actions from the technique of gripping the hand at competitions.

Thus, the efficiency of the sports result at competitions depended by 48.4% on the starting position. More efficient was the left-sided stance, which was more effective than the right-sided one by 2.8% and the mixed one by 51.4%. This was also confirmed by the analysis of effectiveness, which was slightly better among the athletes with a left-sided stance (2.8 points).

The most efficient technique of gripping the hand at competitions was the “top roll” attack (69.1%), and it was also the most effective (4.8 points). The other attack techniques were slightly lower than the top roll, but also showed high efficiency, while in terms of effectiveness they lagged far behind. Therefore, the application in training sessions of various tasks on the technique of attack in a bout is an important component of technical-tactical preparation in arm wrestling.

It is worth noting the great potential of the technique of conducting a bout in the realization of advantage, but it is not presented in this work; among arm wrestlers it should also be improved in the process of training and competitions.

The indicators of activity, efficiency, effectiveness, and effective variability were studied by starting positions and attacking actions, the average values of which are presented in Table 2.

Table 2. Effectiveness of technical techniques among student arm wrestlers in bouts, %

Statistical values	Activity	Efficiency	Effectiveness	Effective variability
$\bar{X}$	6.1	42.2	10.1	8.8
m_x	0.36	2.3	1.09	0.25
σ	1.8	11.7	5.47	1.27
$m\sigma$	0.25	1.65	0.73	0.17

The calculation of Blackman's linearity criterion made it possible to conclude that the connection

between the indicators of the technical-tactical preparedness of student arm wrestlers is nonlinear. Therefore, the strength of the connection was better characterized by the correlation ratio (Table 3).

Table 3. Correlation matrix of the indicators of technical-tactical preparedness

Indicators	Activity	Efficiency	Effectiveness	Effective variability
Activity	-	0.51	0.55	0.52
Efficiency	-	-	0.72	0.70
Effectiveness	-	-	-	0.58
Effective variability	-	-	-	-

A change in activity entailed a change in efficiency (0.51). Most likely, this is connected with the fact that in a bout an arm wrestler had various temporal opportunities for performing technical actions. This was reflected in the successful or unsuccessful outcome of the bout. The correlation ratio showing the connection between efficiency and effectiveness was equal to 0.72. In addition, efficiency was connected with effective variability (0.70), i.e., the efficiency of performing technical actions varied depending on the presence of classification groups and successfully performed technical actions. In turn, effective variability was connected with effectiveness (0.58) and activity (0.52). Effectiveness was also connected with activity (0.55), i.e., a change in the number of points in competitions entailed a change in the number of successful attempts to perform attacking techniques.

Conclusions. All the indicators of technical-tactical preparedness in arm wrestling are interconnected. The indicator of the efficiency of performing technical actions reflects the level of technical-tactical preparedness of arm wrestlers.

In the course of the training process, coaches need to conduct conditioned sparring with various tactical tasks against fighters with oppositely named basic stances. It has been established that the combination of technical-tactical actions increases the volume, efficiency, and effectiveness of the technical-tactical arsenal of the athletes, giving arm-wrestling athletes a tactical advantage in conducting bouts. As sports mastery grows, it is necessary to increase the variability and combinational nature of the technical-tactical set of attacking actions in arm wrestling.



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Change in the muscle activity of the lower limbs of hockey players in the phases of acceleration and uniform skating

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Abstract

Objective of the study is to study the changes in the muscle activity of the lower limbs of hockey players in the phases of acceleration and uniform skating during forward movement.

Methods and structure of the study. The hockey players performed skating at maximum speed over a distance of 30 m from a stationary position at the start. Muscle activity was measured on the basis of the registration of EMG signals in the acceleration phase and the uniform skating phase. The EMG waves of each muscle were normalized relative to the peak step intensity in the steady-state mode.

Results and conclusions. The main factor influencing the push-off forces in the acceleration phase is the activity of the medial gastrocnemius muscle. During uniform skating, the increased activity of the vastus lateralis and vastus medialis muscles provides a greater speed of extension and a greater skating speed.

Keywords: *hockey players, muscle activity, acceleration phase, uniform skating phase.*

Introduction. The movements performed on the speed-skating track are limited to linear and cyclic movements. At the same time, the game of hockey includes accelerations, changes of direction, sudden stops, and cross-over movements, which are quite difficult to record in laboratory conditions [4].

A study of the three-dimensional kinematics of the lower limbs of hockey players of various levels of preparedness on a skating simulator showed significant advantages of highly qualified players in stride length, segmental movements, and an increased range of motion in the joints [3].

The muscle activity of the lower limbs of hockey players during running at various speeds on the speed-skating track was also studied [1]. It was established that an increase in speed leads to enhanced activation of the hip flexors, knee extensors, and plantar flexors of the ankle joint. Kinematic data of skating were also recorded using portable high-speed cameras mounted on the boards of the hockey rink [2].

To date, there are no studies considering the combination of kinematic characteristics and muscle activity during forward movement.

Objective of the study is to study the changes in the muscle activity of the lower limbs of hockey players in the phases of acceleration and uniform skating during forward movement.

Methods and structure of the study. The scientific work involved 10 players of the main lineup of a student team aged 20.5 ± 0.7 years, weighing 78.4 ± 5.3 kg, with a height of 178.0 ± 5.5 cm, and 8 beginner hockey players aged 19.9 ± 0.3 years, weighing 77.3 ± 9.8 kg, with a height of 177.8 ± 4.6 cm.

The hockey players performed skating at maximum speed over a distance of 30 m from a stationary position at the start. The time of performing the exercises was measured using light gates located every 10 m from the start line. This made it possible to record the time of covering the first 10 m (the acceleration phase), the last 10 m (the uniform skating phase), and the entire segment of the distance.



To quantitatively assess the vibrations upon contact of the blade with the ice at the moment of push-off, a 3D accelerometer with a measurement range of ± 35 g was installed on the right skate in the center of the blade. The voltage signals from the accelerometers were recorded and converted into units of gravity (g) by means of calibration in a range of motion of 180° .

Muscle activity was measured on the right leg using bipolar surface electrodes fixed to the skin with an elastic band. The electromyographic (EMG) signals were amplified and sampled at a frequency of 2400 Hz.

In accordance with the phase of contact of the skate with the ice (% of contact) at which the muscle activity was maximal, the biomechanical data at the 2nd and 8th steps of the hockey players were extracted and time-normalized. Contact with the ice was limited by the occurrence and cessation of high vibration amplitudes in the signal of the skate blade accelerometer. The selected steps represented the acceleration phase and the uniform skating phase.

To convert the raw EMG signals into the frequency-time space, the technique of wavelet analysis with 13 nonlinearly scaled wavelets (central frequencies varied from 6.9 Hz to 542 Hz) was used [10].

For the analysis of the signal power, the total EMG intensity was summed over wavelets 2–11. Maximal voluntary contractions were not performed, therefore the EMG waves of each muscle were normalized relative to the peak step intensity in the steady-state mode measured for that muscle. Thus, potential changes in the mechanisms of muscle activation in various phases of the step were studied depending on the type of step; intergroup comparisons were not carried out.

As a statistical measure of similarity for assessing the repeatability of the wave oscillations, the coefficient of multiple correlation was used.

Results of the study and discussion. The participants of the main lineup of the team, in comparison with the beginner hockey players, showed a better time in the acceleration phase, the uniform skating phase, and the 30-meter distance race as a whole ($p < 0.05$). A significant relationship was observed between the level of preparedness of the players and the difference in the time of covering the segments; in the beginner players, the difference between the time of the acceleration and uniform skating phases turned out to be substantially greater than in the hockey players of the main lineup (Table 1).

The positive percentage ratio according to the EMG data during contact with the ice indicates greater muscle activity during the uniform skating phase (Table 2).

When comparing the mode of muscle work in various phases of skating, it was established that, in comparison with uniform skating, the activity of the medial gastrocnemius muscle is significantly higher during the acceleration phase ($p < 0.05$). On the other hand, the vastus lateralis and vastus medialis muscles exhibited greater muscle activity during uniform skating ($p < 0.05$). For the gluteus medius muscle and the tibialis anterior muscle, no significant differences were observed between the uniform skating phase and acceleration.

The increased activity of the knee-joint extensor muscles is an important mechanism providing greater knee extension during the propulsive phase of the skating step. In this regard, it can be assumed that a high skating speed can be achieved through

Table 1. Time of covering the segments of the 30 m distance at maximum effort in skating

Players	Acceleration		Uniform skating		Distance 30 m	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Main lineup	1.89	0.06	1.18	0.08	4.49	0.18
Beginners	2.31	0.08	1.28	0.09	5.36	0.26

Table 2. Changes in the total muscle activity according to the EMG data, $\bar{x} \pm SD$ (%)

Phase	Muscle				
	Medial gastrocnemius	Gluteus medius	Tibialis anterior	Vastus lateralis	Vastus medialis
Acceleration	6.4 ± 0.15	-	5.9 ± 0.11	-	-
Uniform	-	5.1 ± 0.08	-	12.9 ± 0.16	9.4 ± 0.12



accentuated training of the knee-joint extensor muscles.

The smaller angles of knee extension during accelerated skating can also be explained by the high activity of the medial gastrocnemius muscle during these steps. Knee flexion is a secondary function of the gastrocnemius muscle, therefore the significantly greater activity of this muscle in the acceleration phase could have contributed to the lower angle of knee extension.

In the ankle joint, the gastrocnemius muscle acts as a powerful plantar flexor, which is necessary during acceleration in order to provide push-off from a static position. As a result, the maximum and average push-off force turned out to be significantly greater during acceleration. Thus, in the acceleration phase during push-off, a predominance of the activity of the plantar flexors is observed, which limits the range of motion in the knee joint and increases the force of plantar flexion. However, during uniform skating, the increased activity of the knee-joint extensor muscles provides a greater speed of extension and, consequently, a greater skating speed.

Conclusions. The conducted study revealed the acceleration phase as the basis of the skating technique of hockey players, which to the greatest extent distinguishes hockey players of various levels of preparedness. The activity of the medial gastrocnemius muscle is the main factor influencing the push-off

forces during the acceleration phase. During uniform skating, the increased activity of the vastus lateralis and vastus medialis muscles provides a greater speed of extension and, consequently, a greater skating speed.

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Methodology for the development of physical qualities in track-and-field runners at the stage of sports mastery improvement

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Abstract

Objective of the study is the theoretical substantiation of a comprehensive methodology for the directed development of the speed-strength abilities, special endurance, strength, and flexibility of qualified runners within the framework of the annual cycle.

Methods and structure of the study. The methodology includes the analysis of scientific-methodological literature, the systematisation of approaches to the periodisation of loads, and the identification of optimal means of developing the leading qualities.

Results and conclusions. The analysis of the sources showed that in highly qualified athletes the limiting factors are special endurance and running economy. The main approaches rely on the principles of wave-like periodisation. The methodology is built on the integration of the means of running preparation, speed-strength exercises, plyometrics, and gymnastic complexes. The theoretical generalisation made it possible to determine a rational distribution of loads: the predominance of aerobic work in the preparatory period with a gradual increase of the share of high-intensity means in the pre-competition cycle. Attention is paid to the individualisation of the impacts taking into account the morphofunctional features of the athletes and to the control over the recovery of the body. The mechanisms of adaptation to combined loads and the influence of strength preparation on the power of push-off are considered.

Keywords: *development of physical qualities, track-and-field runners, the stage of sports mastery improvement, speed-strength preparation, special endurance, periodisation of training.*

Introduction. The relevance of the study of the methodology of developing physical qualities in track-and-field runners at the stage of sports mastery improvement is determined by the modern requirements for the preparation of highly qualified athletes, where the achievement of stable high results in the middle and long distances is impossible without the purposeful improvement of the speed-strength abilities, special endurance, strength, and flexibility.

At the stage of preparation, qualified runners are faced with the necessity of optimising the training process under the conditions of growing competition and limited resources of the recovery of the body.

The analysis of the scientific-methodological literature shows that the questions of the rational construction of training loads taking into account the individual features of the athletes and the principles of periodisation remain at the centre of the attention of specialists. In the works of domestic authors, the significance of the integral approach to the development of physical qualities in the annual cycle of preparation is emphasised. The theoretical substantiation of the theme relies on the generalisation of the data on the mechanisms of the adaptation of the body to combined loads, where attention is paid to the balance between the volume of aerobic work and the purposeful speed-strength impacts.



The degree of elaboration of the problem in the scientific literature confirms the presence of fundamental studies on the periodisation of the training process; however, the aspects of the individualisation of the means and methods precisely at the stage of sports mastery improvement for runners at distances from 800 to 5000 metres are insufficiently covered. Such an approach makes it possible to reveal the gaps in the existing methodologies and to substantiate the necessity of further theoretical generalisation with the aim of increasing the effectiveness of preparation.

Objective of the study is the theoretical substantiation of a comprehensive methodology for the directed development of the speed-strength abilities, special endurance, strength, and flexibility of qualified runners within the framework of the annual cycle.

Methods and structure of the study. The methodology of the study is based on the theoretical analysis and generalisation of the scientific-methodological literature on the theory and methodology of sports training, including works on periodisation, the means of developing physical qualities, and the features of the preparation of middle- and long-distance runners. Methods of the systematisation of scientific data, of the comparative analysis of approaches to the construction of the training process, as well as of the logical modelling of the optimal ratios of the volumes and intensity of loads were applied.

The organisation of the study provided for the study of publications with an emphasis on sources devoted to the stage of sports mastery improvement. In the course of the work, the leading physical qualities limiting the result in running were identified, with the subsequent determination of the rational means of their development: running exercises of various orientations, plyometric complexes, work with weights of moderate intensity, and gymnastic exercises for maintaining flexibility and strength endurance [1]. Attention was paid to

the principles of wave-like periodisation, where the preparatory period is accentuated on creating a base of aerobic endurance, the competition period – on the integration of speed-strength and interval loads, and the transition period – on active recovery.

The methodology includes recommendations on the distribution of training volumes in the range of 120-180 kilometres per week depending on the period of the cycle, with a pyramidal profile of intensity, where 70-80 per cent of the load falls on the low-intensity zones. The consideration of the individual morphofunctional features of the athletes is carried out through the monitoring of the functional state using pedagogical observations and the analysis of the dynamics of the indicators.

The modelling of the methodology was carried out by means of the consistent generalisation of the literature data and the construction of a logical scheme of the annual cycle, where each period has clearly defined emphases in the development of physical qualities. Attention is paid to the coordination of the means of training with the principles of gradualness, variability, and the individualisation of loads (Table 1).

The ratios of the means make it possible to ensure the consistent and interconnected development of all the leading physical qualities, while preserving the necessary balance between load and recovery at each stage of the annual cycle [6].

Results of the study and discussion. The theoretical analysis and generalisation of the literary sources made it possible to establish that at the stage of sports mastery improvement the development of physical qualities in track-and-field runners is most effective with the integral combination of means ensuring the simultaneous improvement of the speed-strength abilities and special endurance [2].

The obtained results show that the optimal distribution of loads in the annual cycle presupposes the predominance of long cross-country runs and tempo running in the preparatory period with the gradual in-

Table 1. Main means of developing physical qualities by periods of the annual cycle

Period of the cycle	Speed-strength abilities	Special endurance	Strength and flexibility
Preparatory	Plyometrics (low intensity), multi-jumps	Long cross-country runs, tempo running	Exercises with weights, gymnastic complexes
Pre-competition	Plyometrics (medium and high intensity), running with weights	Interval training, fartlek	Strength exercises of moderate intensity, stretching
Competition	Speed segments, jumping exercises	Special running segments at competitive speed	Maintaining gymnastic complexes
Transition	Light plyometrics (recovery)	Low-intensity cross-country runs	Active recovery and flexibility

**Table 2. Distribution of the volume and intensity of training loads by periods of the annual cycle**

Period of the cycle	Running volume, km/week	Share of low-intensity loads, %	Share of high-intensity loads, %	Number of plyometric sessions per week
Preparatory	150-180	75-80	10-15	1-2
Pre-competition	120-140	60	25-30	2-3
Competition	80-110	50	35-40	1-2
Transition	60-80	85-90	5-10	0

introduction of interval training and plyometric exercises in the pre-competition phase. The data confirm that such a sequence contributes to increasing the economy of running through the improvement of the power of push-off and the coordination of movements, and also minimises the risk of overtraining thanks to the strict control of recovery measures.

The consideration of the mechanisms of the adaptation of the body revealed the positive influence of moderate weights and multi-jump exercises on the development of the strength endurance of the muscles of the legs and torso, which directly correlates with the improvement of results at distances of 1500-5000 metres.

The modelling showed the expediency of using variable training (fartlek) for maintaining the variability of loads and the prevention of monotony, which is necessary for qualified athletes with a long training history.

The generalisation of the approaches to the individualisation of preparation highlights the necessity of correcting the volumes depending on sex, age, and the current level of preparedness. Women demonstrate a greater sensitivity to aerobic loads, and men – to speed-strength impacts.

The obtained conclusions are consistent with the modern trends in the construction of the training process and open prospects for the practical application of the developed recommendations (Table 2) [3, 4].

The analysis demonstrates the gradual reduction of the total volume of running from the preparatory to the competition period with the simultaneous growth of the share of high-intensity loads. Such a profile makes it possible to preserve the aerobic base at the initial stages and to transition to peak form closer to the main starts [7]. The parameters of the plyometric sessions are selected so as to ensure the development of the power of push-off without exceeding the recovery capabilities of the body (see the figure).

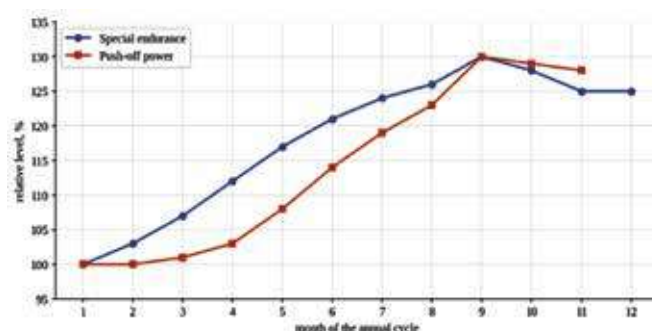


Figure 1. Dynamics of the indicators of special endurance and push-off power during the annual cycle

The figure reflects the positive dynamics of both indicators throughout the entire annual cycle. Special endurance demonstrates a steady growth already from the beginning of the preparatory period and reaches its maximum by the 10th month. The power of push-off begins to increase actively from the 4th month and reaches its peak simultaneously with endurance, which corresponds to the optimal moment for competition starts [5].

Conclusions. The methodology of developing physical qualities in track-and-field runners at the stage of sports mastery improvement, developed on the basis of theoretical analysis, ensures the harmonious improvement of the speed-strength abilities, special endurance, strength, and flexibility within the framework of the annual cycle.

The obtained results of the theoretical study confirm the effectiveness of the integral approach with wave-like periodisation and the individual distribution of loads, which leads to the increase of the economy of running and the stability of competitive results.

The proposed methodology can be recommended for introduction into the practice of preparing qualified runners in sports schools of the Olympic reserve and in national teams with the obligatory monitoring of the functional state.



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The relationship of the autonomic regulation of heart rate with postural control indicators in young athletes

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Abstract

Objective of the study is to study the features of the autonomic regulation of heart rate and postural control in young badminton athletes.

Methods and structure of the study. The scientific work was conducted on the basis of the Research Institute of Physical Culture and Sports of the Volga Region State University of Physical Culture, Sports and Tourism. 16 young athletes engaged in badminton with a level of sports mastery from the second adult category to candidate for master of sports, and 26 representatives of the control group not engaged in sports were examined. Postural control was assessed using a stabiloplatfrom with biofeedback by means of the Romberg test (eyes-open and eyes-closed test), as well as the registration of the electrocardiogram and heart rate variability using the PowerLab installation (ADInstruments, Australia).

Results and conclusions. Significant correlations were revealed between the indicators of heart rate variability and the stabilographic parameters of postural control, in particular, with the eyes closed. The athletes exhibited a higher level of the absolute power of VLF and a dominance of the sympathetic nervous system, which possibly reflects the role of centralized autonomic mechanisms in ensuring the stability of postural control. At the same time, the differences in motor activity form the features of the autonomic regulation and postural control, but the direct influence of the autonomic system on postural control may be non-obvious.

Keywords: *autonomic regulation, postural control, equilibrium function, stabiloplatfrom technologies, physical loads, badminton.*

Introduction. The effectiveness of postural control depends on the complex integration of various body systems and is subject to the influence of many external and internal factors. In sports, the variability of postural control is of particular significance, since it directly affects the effectiveness of complex-coordination movements and, consequently, sports mastery [4].

The quality of postural control is especially important in sports where tactical-technical skills require a high level of control, which is characteristic of situational sports. The scientific review by Zemkov E. and co-authors [5] showed that out of 126 analyzed articles, in 14 a connection was revealed between the indicators of postural balance and sports effectiveness. Associations between postural control and sports re-

sults were found in shooting, archery, golf, baseball, hockey, tennis, and snowboarding, which emphasizes its significance for sports activity.

The internal factors influencing postural control include the functional state of the body, the level of sports mastery, the degree of biological maturity, and the presence of overtraining or fatigue [3]. The external factors include the specificity of the sports activity, where multiple repetitions of technically complex actions in various conditions can form a certain pattern of postural control, which in a number of cases can be the cause of increased injury rates [5].

In this connection, the study of the features of postural control in young badminton players is relevant, since this sport places high demands on coordination abilities. The importance of the study is also due to the

fact that in adolescence and youth the processes of the morphofunctional maturation of the central nervous system, the sensory systems, and the musculoskeletal apparatus are not yet complete, which may condition the instability of the mechanisms of postural balance. Of particular interest are the systems of autonomic regulation, which in young athletes have not yet reached the level of maturity as in adults. Studies show that with age a decrease in the indicators of the autonomic provision of heart rate is observed both in athletes and in untrained people, which reflects a decrease in the plasticity and reactivity of the autonomic nervous system [1].

Objective of the study is to study the features of the autonomic regulation of heart rate and postural control in young badminton athletes.

Methods and structure of the study. The scientific work was conducted in the first half of the day on the basis of the Research Institute of Physical Culture and Sports of the Volga Region State University of Physical Culture, Sports and Tourism (Kazan). 16 young athletes engaged in badminton with a level of sports mastery from the second adult category to candidate for master of sports, and 26 representatives of the control group not engaged in sports were examined. The age of the subjects was 13–16 years.

The assessment of postural control was carried out using the stabiloanalyzer with biofeedback “Stabilan-01” of CJSC “OKB ‘Ritm’” (Taganrog) by means of the Romberg test (eyes-open and eyes-closed test): R (mean scatter), mm – the mean radius of the deviation of the center of pressure; VS, mm²/s – an indicator characterizing the mean-amplitude speed of the change of the area of the statokinesigram; OD (motion assessment), conv. units – characterizes the indicators “curve length” and “mean scatter,” which, when decreasing, show improvements in the quality of postural control; QEF, % – the quality of the equilibrium function, assesses how minimal the speed of oscillation of the center of pressure is when maintaining the vertical posture.

The electrocardiogram and heart rate variability were registered using the PowerLab installation (ADInstruments) throughout the entire study protocol, with a spectral analysis of heart rate variability with the isolation of the spectra VLF (Very Low Frequency) 0.0033–0.04 Hz; LF (Low Frequency) 0.04–0.15 Hz; HF (High Frequency) 0.15–0.4 Hz. The processing was carried out using the built-in HRV analysis module in the LabChartPro software.

The results of the study were processed in the SPSS 27 program. Spearman’s correlation analysis was performed, and the ANOVA test with the Bonferroni correction was carried out. Differences were considered statistically significant at $p < 0.05$.

Results of the study and discussion. In the course of the data analysis, correlations of a number of heart rate variability indicators with the stabilographic parameters of postural control were found; at the same time, the greatest correlations, both in number and in strength, were in the athletes. Thus, the greatest correlations were noted with the indicators of the spectral power of the slow-wave range VLF, measured in absolute values, with the indicator of motion assessment ($r = 0.68$, $p = 0.003$), obtained in the stabilographic test with the eyes closed, and with the mean scatter of the center of pressure (R), obtained in the eyes-closed position ($r = -0.8$, $p = 0.0001$, see the figure).

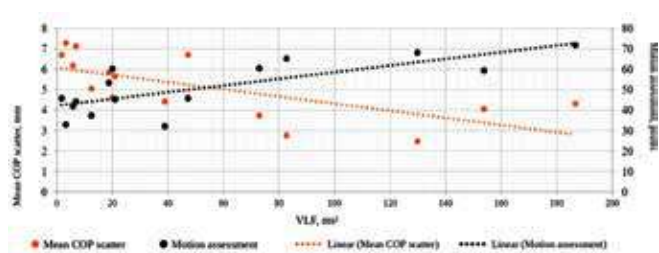


Figure 1. Spectral power of the low-frequency range of HRV and its correlations with the indicators of the mean scatter of the center-of-pressure position (COP) and motion assessment

Table 1. Spectral characteristics of HRV in athletes and non-athletes

Indicators	Athletes	Non-athletes
VLF	$228.87 \pm 704.00^* (8.99 \pm 8.54)$	$127.59 \pm 145.03 (9.96 \pm 7.10)$
LF	$888.28 \pm 1768.67 (45.90 \pm 18.88^*)$	$1050.42 \pm 1170.36 (60.43 \pm 18.70)$
HF	$1480.29 \pm 3167.68 (39.36 \pm 23.97)$	$466.13 \pm 666.27 (28.74 \pm 17.15)$
LF/HF	$1.76 \pm 1.72^*$	3.70 ± 3.43

Note. The table presents the absolute values of the spectral power (ms²); the relative values (%) are indicated in parentheses. The data are given as the mean value and standard deviation ($M \pm SD$); “*” – statistical significance between the groups.



A similar correlation was also noted with the indicators of the speed of change of the area of the statokinesigram ($r=-0.7$, $p=0.0001$). On the one hand, it can be assumed that the increased activity of the low-frequency range, from the standpoint of postural control, is a positive internal factor improving its quality. The presence of stronger connections with the indicators obtained with the eyes closed is possibly connected with the fact that the demands on the central integration of sensorimotor and autonomic regulation increase. At the same time, this is expressed not only in the absolute values of VLF, but also in the percentage of contribution to the total spectrum. The dynamics of the changes in response to the closing of the eyes also has negative correlations with the mean scatter of the center of pressure ($r=0.8$, $p<0.0001$).

On the other hand, the comparison of the spectral data with the data of the non-athletes showed that the athletes exhibit a higher level of the absolute power of the VLF component, as well as a more pronounced dominance of the sympathetic nervous system – statistically significant differences in the LF/HF ratio (see the table), which is also noted by other researchers [1]. Possibly, this testifies to a more pronounced role of the slow, centralized mechanisms of autonomic regulation, ensuring the stability of postural control. This is partly confirmed by studies of judokas, which showed that the indicators of heart rate variability are associated with better performance of technical techniques, which is impossible without good coordination qualities and postural control [2]. The most well-known indicator – the quality of the equilibrium function – did not have any correlations with the indicators of the autonomic regulation of the heart in the studied groups.

We believe that the differences in motor activity determine both the features of the autonomic regulation and postural control. The direct influence of the autonomic system on postural control may thereby be absent.

Conclusions. This study demonstrated the presence of interrelations between the indicators of the autonomic regulation of heart rate and the characteristics of postural control in young athletes specializing in badminton. It should be especially noted that the most pronounced correlations were observed for the indicators of the slow-wave range of heart rate variability under conditions of sensory deprivation. This fact suggests that under conditions of reduced sensory afferentation, the central mechanisms of regula-

tion play a key role in ensuring postural stability in this group of subjects.

In addition, the comparative analysis revealed significant differences between the athletes and the non-athletes, namely: a higher level of the absolute power of the VLF component and a lower value of the LF/HF index in the athletes. These differences probably reflect the adaptive functional changes of the autonomic nervous system, conditioned by the specificity of the training process in badminton. The obtained data confirm the hypothesis that the observed features of the indicators of heart rate variability and postural control in young athletes are rather a consequence of the long-term adaptation to specific motor activity than a direct effect of the autonomic nervous system on the mechanisms of maintaining balance. It is important to note that this adaptation is apparently connected with the restructuring of the central mechanisms of the control of postural control under a deficit of sensory information.

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Development of Cybathletics: Integration of Autogenic Training

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Abstract

Objective of the study is to determine the impact of using self-regulation methods (autogenic training, visualization, breathing techniques) on the emotional state, concentration, and athletic performance of cybathletes during the preparation stages and during competitions.

Methods and structure of the study. To achieve this goal, the following methods were used: analysis and synthesis of specialized scientific and methodological literature; observation of the cybathletes' behavior and reactions; application of the anxiety assessment method of Ch.D. Spielberger and Yu.L. Khanin; statistical analysis of the obtained data.

The study was conducted on the basis of two sporting events: the VII Martial Arts and Strength Sports Festival in Honor of Grand Duke Dmitry Donskoy (October 25–26, 2025, Suzdal) and the Cybathletics Festival, which was timed to coincide with Yaroslavl City Day 2025 (May 31, 2025). Thirty cybathletes participated in the study. The participants in the competition were individuals with disabilities who use technical rehabilitation equipment.

Results and conclusions. The conducted study showed an improvement in the overall psychological state and an increase in the stability of the performance of cybathletes after the systematic use of elements of autogenic training in the preparation process. A decrease in the level of anxiety before competitions and an increase in concentration directly during the performance were noted. The findings of the study confirm that the use of autogenic training in the process of preparing cybathletes makes it possible to: increase the psychological resilience of cybathletes before competitions; ensure higher-quality exercise performance by stabilizing the emotional state of participants with disabilities; and optimize the process of athletic preparation, making it more effective.

Keywords: *cybathletics, people with disabilities, psychological preparation, rehabilitation, autogenic training, physical exercise.*

Introduction. The first international “Cybathlon” competitions were held on October 8, 2016, in Zurich [10]. This unique event brought together people with disabilities who used high-tech assistive devices, including prostheses, exoskeletons, and neurointerfaces. The Cybathlon is not an Olympics, nor even a Paralympics; it is precisely a competition of the technologies used by cybathletes. The main goal of this discipline is to demonstrate the capabilities of technologies and to adapt people with disabilities to an active life.

In Russia, the Cybathlon came to be called cybathletics, and its participants – cybathletes [4]. The term

“cybathletics,” which arose in the Russian information space, became a symbol of innovative approaches to the development of elite sport and the social integration of persons with disabilities. The international recognition of the discipline is confirmed by the fact that ten countries (Vietnam, Egypt, India, Indonesia, Iran, Malaysia, Nigeria, Russia, Saudi Arabia, South Africa) have already signed a memorandum of intent to create an international cybathletics league [7], which testifies to its growing influence on the world community. At the same time, the domestic practice of organizing sporting events is also actively developing. One striking example is the third open Moscow championship



in cybathletics, held from September 13 to 15, 2025. This event became a platform for demonstrating the latest developments and achievements of Russian engineers, who contribute to the development of the domestic sports movement [6]. Such events allow cybathletes to demonstrate the unique abilities of controlling high-tech devices, contributing to the popularization of cybersports disciplines among a wide audience.

Of particular note is the registration by the Ministry of Justice of the Russian Federation of the Interregional Physical Culture and Sports Public Organization "Cybathletics Federation," which took place on January 28, 2026 [8]. This procedure consolidated the official status of the new sports federation, becoming an important stage in the institutionalization of the discipline in our country. The organization is designed to coordinate the activities of the community participants, develop the regulatory framework, organize competitions of various levels, and ensure the training of qualified specialists. Thus, cybathletics is becoming part of the global trend of introducing advanced technologies, opening new horizons for the self-realization and personal growth of people with special needs.

The development of the discipline also contributes to improving the quality of life of people with physical disabilities, providing them with the conditions for full participation in public life and the achievement of success at the professional level.

From 2022 to the beginning of 2026, more than 300 cybersportsmen took part in competitions in Russia. At many competitions, round tables are held on the topics of adaptive physical culture and sports, as well as the features of using various rehabilitation techniques (hereinafter – TRE, technical rehabilitation equipment) [10].

The relevance of the topic is due to the need to analyze the current trends and prospects for the further development of cybathletics as a sport of the future. Scientific and technological progress creates the prerequisites for the formation of a fundamentally new approach to the physical education and health improvement of the population, allowing people with physical disabilities to achieve outstanding results thanks to the use of modern technical solutions.

Psychological resilience is a key factor in the success of any athlete [2, 5], and especially of cybathletes, since disabilities create additional loads that affect the effectiveness of a cybathlete's performance. Therefore, a special training system that includes ele-

ments of psychophysical preparation becomes an important tool for improving results.

Objective of the study is to determine the impact of using self-regulation methods (autogenic training, visualization, breathing techniques) on the emotional state, concentration, and athletic performance of cybathletes during the preparation stages and during competitions.

Methods and structure of the study. Analysis and synthesis of specialized scientific and methodological literature on the psychological preparation of athletes with disabilities was applied; observation of the behavior and reactions of cybathletes; the method of anxiety assessment of Ch.D. Spielberger and Yu.L. Khanin was used to assess the emotional state of cybathletes; statistical analysis of the obtained data.

Results of the study and discussion. In the process of preparing for the tournament "VII Martial Arts and Strength Sports Festival in Honor of Grand Duke Dmitry Donskoy" (October 25–26, 2025), the organizing committee approved the rules of the regional tournament – Cybathletics SUZDAL 2025. The competitions were held in cybathletics in the following disciplines: forearm prostheses (ARM), shin and thigh prostheses (LEG). At the Cybathletics Festival, which was timed to coincide with Yaroslavl City Day 2025 (May 31, 2025), the competitions were held in the disciplines: shin prostheses, thigh prostheses, including double amputation.

The peculiarity of the competitions in the ARM and LEG disciplines lies in the fact that the use of any means of movement (for example, support frames, crutches, canes, etc.) during the competitions is prohibited. The participants in the competitions cover the distance against the clock and must correctly perform motor tasks (exercises), which are different for each discipline.

Each pilot is assessed relative to the results of all the other pilots in a particular discipline, depending on the time, the covering of the distance, and the points scored. If, in one discipline and at the same stage of the competition, two or more pilots score the same number of points for completion at the same completion time, then an additional race is held to determine their places in the overall standings of the discipline.

The main differences between the two tournaments:

Yaroslavl (May 31). Emphasis on lower-limb prostheses (shin and thigh), including a category for people with double amputation.

Table 1. Comparative analysis of cybathletics tournaments (2025)

Comparison criterion	Festival in Yaroslavl (May 31)	Tournament in Suzdal (October 25–26)
Status of the event	Timed to coincide with City Day	Within the framework of the VII Festival named after Dmitry Donskoy
Disciplines (lower limbs)	Shin, thigh prostheses (incl. double amputation)	Shin and thigh prostheses (general LEG category)
Disciplines (upper limbs)	Not declared	Forearm prostheses (ARM)
Priority of preparation	Technical: primary mastering of technologies	Psychophysical: psychological resilience
Key method	Adaptation to the prosthesis	Adaptation to the prosthesis and a system of autogenic training
Result of implementing the methodology	Mastery at a basic level	Qualitative growth of the stability of athletes

Table 2. Influence of autogenic training on the participants of the competitions in Yaroslavl and Suzdal in cybathletics

Sphere of influence	ARM discipline (forearm prostheses)	LEG discipline (shin and thigh prostheses)
Fine motor skills and precision	Reduction of stump tremor. Allows more precise control of the prosthesis myo-sensors when gripping small objects	Improvement of coordination. Helps to position the foot more precisely when overcoming obstacles (stairs, bumps)
Muscle tone	Relief of clamps in the shoulder girdle, which increases the amplitude of movements and the speed of manipulations	Optimization of tension in the muscles of the stump and back
Phantom pains	Relief of uncomfortable sensations that can distract from performing the technical task	Reduction of the intensity of phantom pains, which intensify under physical load on the supporting leg
Psycho-emotional background	Formation of a “state of flow” for the rapid change of action algorithms (everyday tasks against the clock)	Suppression of the fear of falling when passing dynamic stages (inclined surfaces, stepping over)
Sensory integration	Improvement of the mental acceptance of the prosthesis as “one’s own” hand, which speeds up the reaction time	Enhancement of proprioception (the sense of space), helping to “feel” the surface through the prosthesis socket

Suzdal (October 25–26). A broader coverage, including both arm prostheses (forearm – ARM) and leg prostheses (shin and thigh – LEG).

At the above-mentioned 2025 tournaments in Yaroslavl and Suzdal, the psychological preparation of cybathletes played a key role. Autogenic training (AT) is a method of self-suggestion [1, 3, 5], which allows athletes with limb prostheses to manage their psycho-emotional and physical state before going onto the track.

Below is a comparative analysis of the disciplinary achievements and the focus of preparation for the tournaments in Yaroslavl and Suzdal based on the protocol data (Table 1) [6].

Below is a table of the influence of AT on cybathletes depending on the specifics of the disciplines (ARM and LEG) (Table 2).

Also, in the course of the experiment, a program of autogenic training (AT) for cybathletes was tested, which included several stages: basic relaxation, neurointegration (acceptance of the prosthesis), ideomotor tuning, and mobilization. Since, for a cybathlete, it is important not just to relax, but to “synchronize” with their technical rehabilitation equipment. In this regard, various exercises, formulas, etc., which A.V. Rodionov used in his works, were applied [2, 9].

The study was conducted on two groups of cybathletes: an experimental one (with the use of AT) and a



control one (without AT). The main results are listed below.

1. Reduction of the level of anxiety

The assessment was carried out using the method of Ch.D. Spielberger and Yu.L. Khanin before and after the application of AT.

Experimental group:

- before the application of AT, an increased level of situational anxiety before the start was observed, characteristic of competitive stress;

- after the cycle of sessions, a steady reduction of anxiety before performances was noted – the cybathletes described their state as “more calm,” “confident”;

- the severity of the physiological manifestations of anxiety (rapid breathing, trembling, etc.) decreased.

Control group:

- no significant changes in the level of anxiety were revealed;

- before the start, signs of emotional tension persisted.

2. Increase in the stability of athletic results

The analysis was carried out on the basis of data on the time of covering the distance and the number of successfully completed tasks.

Experimental group:

- the results of the performances became more stable from start to start;

- the number of gross errors associated with the loss of coordination or the ineffective distribution of efforts decreased;

Control group:

- the demonstrated results were characterized by high variability;

- cases of a sharp decrease in effectiveness in the second half of the performance were recorded.

Conclusions. The results of the conducted study confirm the effectiveness of using autogenic training in the preparation of cybathletes. The AT program contributed to: the reduction of emotional tension before competitions; the improvement of concentration in the conditions of competitive activity; the formation of a sense of unity of the body and the technical rehabilitation equipment.

Key advantages of the method:

- ease of implementation into the training process;
- the absence of the need for additional equipment;

- the possibility of adaptation to the individual characteristics of the athlete and the type of prosthesis.

Russia possesses significant experience in the development and implementation of innovative rehabilitation tools and methods of psychophysical preparation. This experience can become the basis for international cooperation and the development of cybathletics as a global movement.

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Conjugated execution of maneuvers of defensive and counterattacking actions used by athletes in applied martial arts for training personnel to perform apprehension techniques

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Abstract

Objective of the study is to identify the techniques of maneuvering of defensive and counterattacking actions used by athletes in the competitive activity of applied martial arts for training the personnel of the internal affairs bodies in the use of apprehension techniques.

Methods and structure of the study. An analysis was carried out of information sources devoted to the problem of the conjugated execution of maneuvers of defensive and counterattacking actions used by athletes in applied martial arts.

Results and conclusions. In the article, the author reveals the features of defensive and counterattacking actions against strikes performed by martial-arts athletes in competitive activity. The issues of technical actions for defense against punches, performed by sequential and combined actions for carrying out apprehension techniques, are considered. Tactical-technical actions of performing conjugated maneuvering, used by athletes in applied martial arts for performing defensive and counterattacking actions with the subsequent application of tactical preparations, are proposed.

Keywords: *maneuvering combat, conjugated combinations, defensive and counterattacking actions, combat interactions, counteraction, combat tactics.*

Introduction. In modern conditions, the participation of the world's leading athletes in important competitions in combat sports, in order to achieve high results, makes use of maneuvering combat and maneuvering combat conduct. Maneuvering combat represents a combination of maneuvers in combinations that are performed simultaneously, conjugately, and jointly, leading to the irrational reactions of the opponent and to his loss.

Objective of the study is to identify the techniques of maneuvering of defensive and counterattacking actions used by athletes in the competitive activity of applied martial arts for training the personnel of the internal affairs bodies in the use of apprehension techniques.

Methods and structure of the study. An analysis was carried out of information sources devoted to the problem of the conjugated execution of ma-

neuvors of defensive and counterattacking actions used by athletes in applied martial arts.

Results of the study and discussion. The criterion for assessing defensive and counterattacking combinations during the apprehension of offenders is the efficiency and safety of performing the official task. A wide representation of varieties of performing defensive and counterattacking actions is presented in the competitions of martial artists, which allow us to draw statistical conclusions and assess their effectiveness.

In the tactical-technical training of personnel, there is a difficulty in forming the abilities and skills of performing professional competencies in resolving conflict counteractions in extreme situations of official activity.

The application of basic combat tactical interactions in neutralizing and apprehending offenders is



associated with the resolution of conflict interactions, often turning into open counteraction in situations of variable uncertainty. These skills are widely used in striking martial arts such as combat sambo and army hand-to-hand combat.

In the course of analyzing the technical actions for defense against punches in the training of personnel and athletes, two main ways of their execution are distinguished: by sequential and by combined actions. Unlike sequential actions, when time is lost on deceleration at the end of one element and the acceleration of the next, in the entire sequence of combat actions the execution time is slowed down, whereas in combined execution several actions are performed simultaneously and therefore the speed increases. In joint simultaneous execution of actions, acceleration is achieved due to the fact that the end of the previous action, in terms of motor parameters, is suitable for carrying out the subsequent action.

Solving such tasks by the sequential application of these actions has low effectiveness. For the successful execution of counterattacking actions, they must be carried out simultaneously, when conjugated execution in combinations makes it possible to outstrip the opponent by performing effective actions in competitive activity or for the employee to quickly transition to an apprehension technique.

The application of the principles of constructing defensive and counterattacking actions against strikes and throws by police officers in situations of operational-official activity is analogous to that for combat sambo and other striking martial arts.

At the same time, it should be noted that, among scientific studies on the study of combat sports, works on counteracting the tactics of maneuvering of martial artists in competitive activity, showing the actions of the confrontation that are hidden from the opponents, have acquired great importance.

The transfer of competitive experience from the wrestling of combat sambo in combining maneuvers during defensive and counterattacking actions makes it possible to improve the effectiveness of the application of apprehension techniques. Personnel engaged in service-applied combat sports apply maneuvering and tactical preparations to carry out counterattacking combinations with the subsequent apprehension of the offender.

The elimination of possible resistance and the transition from striking technique to performing the

apprehension is realized through the simultaneous application of several defensive actions. To achieve a result, the simultaneous execution of two or three maneuvers included in the combinations should be performed, which makes it possible to outstrip the opponent and quickly perform effective actions. The temporal indicators of performing one's own actions, which have an impact on the opponent, must be determined by the reduction of the execution time due to the conjugated maneuver of defensive and tactical preparations for performing the counterattacking strike. The process of combining actions makes it possible to accelerate their execution two or three times due to the combination of maneuvers for the application of defenses and tactical preparations and the adoption of the starting position for several actions simultaneously.

The result of achieving success in the counteraction between fighters in a bout is the tactics of combat conduct. Depending on the development of the situation in the state of combat interaction, in the process of counteractions with the opponent, the tactics make it possible to vary the execution of defensive and counterattacking actions in a timely and rapid manner.

In competitive activity, tactics are the key link determining the effectiveness of the result; the use of knowledge of the conjugated maneuvering of leading martial-arts athletes will help to improve the tactical-technical training of the personnel of the internal affairs bodies.

In combat sports, after performing a defense, the execution of counterattacking actions – strikes – is carried out predominantly to the head or the body. In bouts, punches are delivered as quickly as possible, therefore, when performing defensive and counterattacking actions, athletes use various combinations of constructing combat interactions; in this way they make it possible to achieve a positive result in bouts.

Using additional maneuvering techniques, the athlete needs to bring the opponent into a favorable situation for entering into combat interaction for the application of defensive and counterattacking actions. The effectiveness of combining maneuvering techniques to achieve a result increases when they are carried out by means of the tactical and technical actions of one combination or with a switch to another combination. The additional execution of maneuvering techniques will make it possible to de-



termine the tactical actions and methods of combat interaction that allow the effective execution of an effective combination practiced in the training process.

In competitive activity, the tactics of conducting combat interaction are the key link determining the effectiveness of the result; the use of knowledge of conjugated maneuvering, applied by martial-arts athletes, will help to improve the tactical-technical training of performing defensive and counterattacking actions with a switch to the tactical preparations of personnel performing official tasks.

Conclusions. The effectiveness of the defensive and counterattacking actions of personnel during the apprehension of offenders is ensured by the combined (simultaneous) execution of several maneuvers, which reduces the reaction time by 2–3 times, in comparison with sequential actions. The principles of constructing such techniques are analogous to those used in striking martial arts (combat sambo, army hand-to-hand combat), therefore the transfer of the competitive experience of the conjugated maneuvering of athletes makes it possible to increase the effectiveness of the tactical-technical training of personnel. The key factor of success is the tactics of combat conduct, ensuring the timely variation of defensive-counterattacking combinations in conditions of extreme uncertainty.

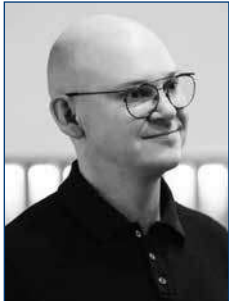
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Pedagogical monitoring and correction of the physical condition of female university students in sports-applied fitness-boxing classes

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Abstract

Objective of the study is to substantiate and develop test exercises for the monitoring and correction of the preparedness of female university students in sports-applied fitness-boxing classes.

Methods and structure of the study. The scientific work was conducted on the educational base of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. More than 700 first- and second-year female students and 35 specialists, coaches, and teachers of physical culture and sports took part in the experiment. At the preliminary stage, testing of the preparedness of the participants of the experiment was carried out, as well as a survey of coaches and teachers on the subject of which test exercises are the most effective for the monitoring and correction of the preparedness of female students in sports-applied fitness-boxing classes. Thus, all this contributed to the accumulation of factual material and the formation of blocks of test exercises for monitoring the preparedness of female university students in sports-applied fitness-boxing classes.

Results and conclusions. Based on the results of the conducted work, the following blocks of test exercises were developed and formed for monitoring the preparedness of female university students for sports-applied fitness-boxing classes:

- Control exercises for general physical preparedness (GPP): running 1000 m and 60 m; standing long jump; raising the torso from a lying position for one minute; forward bend from a sitting position on the floor; flexion and extension of the arms from a support-lying position on the floor.
- Control exercises for special physical preparedness (SPP): jumping on two legs with a skipping rope for one minute (number of jumps); straight punches in a boxer's stance on the bag for one minute (number of times); from a standing position in a boxer's stance, alternating lunges for one minute (number of lunges).
- Technical preparedness (TP): imitation of simple technical actions from boxing (shadow boxing); various striking technical actions with the boxing bag.

The developed control exercises make it possible to effectively manage the preparation of female university students in sports-applied fitness-boxing classes.

Keywords: *blocks of control exercises, university, female students, preparedness, fitness boxing.*

Introduction. The active involvement of student youth in systematic physical culture and sports activities is an important state task. The President and the Government of the country have given the message about the need to involve up to 80% of young people in active physical culture and sports activities by 2030. At the same time, as practice and various statistical sources show, fewer than 50% of students adhere to the need to systematically engage in physical culture and sports. Of particular concern is the low physical-

culture and sports activity of female university students. Only 30% of girls out of the total number of female university students of the country periodically engage in physical culture and sports. At the same time, in society there is a trend of aggressive behavior against the state, society, people, the personality, etc. Especially defenseless in this direction are children and adolescents, elderly people, women, and girls. In this connection, the scientific theme of the search for and development of new technologies, forms, and



Table 1. Control exercises and standards for female students engaged in fitness boxing

No.	Control exercises	Points (levels)		
		3 (low)	4 (medium)	5 (high)
1.	Running 1000 m, min/s	4.40	4.21	4.10
2.	Running 60 m, min/s	10.5	9.8	9.1
3.	Standing long jump, cm	158	172	183
4.	Forward bend from a sitting position on the floor, legs together, cm	5	10	14
5.	Flexion and extension of the arms from a support-lying position on the floor (number of times)	8	14	21
6.	Jumping on two legs with a skipping rope for one minute (number of times)	60	68	75
7.	Straight punches in a stance on the boxing bag for one minute (number of times)	53	64	71
8.	Alternating lunges in a boxer's stance for one minute (number of lunges)	51	63	69
9.	Raising the torso for one minute (number of times)	28	35	43

means in the physical education of students at a university has emerged, contributing to the solution not only of educational, health-improving, and upbringing tasks, but also of applied ones, which are aimed at forming the readiness of youth (especially female students) to resist various forms of aggression in modern society.

Objective of the study is to substantiate and develop test exercises for the monitoring and correction of the preparedness of female university students in sports-applied fitness-boxing classes.

Methods and structure of the study. The scientific work was conducted on the educational base of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. More than 700 first- and second-year female students and 35 specialists, coaches, and teachers of physical culture and sports took part in the experiment. At the preliminary stage, testing of the preparedness of the participants of the experiment was carried out, as well as a survey of coaches and teachers on the subject of which test exercises are the most effective for the monitoring and correction of the preparedness of female students in sports-applied fitness-boxing classes. Thus, all this contributed to the accumulation of factual material for the formation of blocks of test exercises for monitoring the preparedness of female university students in sports-applied fitness-boxing classes.

Results of the study and discussion. Through the analysis of scientific-methodological work on the topic of the work, the attendance of practical fitness-boxing classes among the female students of the state

agrarian university, as well as by the method of expert assessments (coefficient of concordance), test exercises were formed for the monitoring and correction of the preparedness of female university students for sports-applied fitness-boxing classes.

In our work we give the following definition of the new direction in the physical education of female university students: “sports-applied fitness boxing” is a comprehensive pedagogical process based on the integration of modern fitness technologies in combination with technical actions and exercises from other sports, in particular boxing. All this on the whole makes it possible to comprehensively solve educational, health-improving, motor, and applied tasks in the physical education of students and, in particular, female university students.

Blocks of control exercises:

– General physical preparedness (GPP): running 1000 m (min/s) and 60 m (s); standing long jump (cm); raising the torso from a lying position for one minute (number of times); forward bend from a sitting position on the floor (cm); flexion and extension of the arms from a support-lying position on the floor (number of times);

– Special physical preparedness (SPP): jumping on two legs with a skipping rope for one minute (number of times); straight punches in a stance on the boxing bag for one minute (number of times); from a standing position, alternating lunges in a boxer's stance for one minute (number of lunges);

– Technical preparedness (TP): imitation of technical actions (strikes) – “shadow boxing” for two min-



utes, where the technique and synchronicity of performing the striking boxing movements are assessed; boxing for two minutes with the bag, where the precision and force of the strikes and their diversity are assessed.

The table presents the blocks of control exercises and standards that make it possible for coaches-teachers to regulate the preparation of female students in sports-applied fitness-boxing classes.

Conclusion. The conducted scientific-methodological work contributed to the development of blocks of test exercises and standards for the operational and current monitoring of the preparedness of female students engaged in fitness boxing at a university. Also, the developed new sports-applied direction “fitness boxing” can be recommended for the practice of the physical education of university students of the country.

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«Care of the self» as a pedagogical concept of the physical education of student youth

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Abstract

Objective of the study is to analyze in what way the concept of “care of the self” can act as an instrument of the physical education of the student youth of the city of Volgograd, and to substantiate the pedagogical guidelines ensuring the transition from the recognition of the value of health to regular practices of self-preserving behavior.

Methods and structure of the study. The article reveals the potential of the concept of “care of the self” as a pedagogical instrument of the physical education of student youth and shows its connection with the stability of everyday practices aimed at strengthening health. The empirical base of the study is represented by the results of a questionnaire survey of 400 students aged 17–30 studying in the educational organizations of the city of Volgograd.

Results and conclusions. It was established that the majority of the respondents recognize the care of health and education as socially significant practices influencing the possibility of being useful to society, and at the same time a gap is recorded between the expressiveness of the value attitudes and the regularity of actions. A conclusion is drawn about the pedagogical expediency of designing, in the university environment, an “infrastructure of care of the self,” translating the intentions of students into regular forms of physical-culture and health-improving activity and self-regulation.

Keywords: *care of the self, physical education, student youth, Volgograd, questionnaire survey, health preservation, everyday practices.*

Introduction. The modern pedagogy of the physical education of students increasingly turns to the problem of the discrepancy between the declared value of health and the insufficient stability of real behavioral practices: the regimen of motor activity, self-control, prevention, the rational organization of educational and life load not infrequently have a fragmentary character. For student youth, this problem is intensified by the high intensity of educational and informational loads, the prevalence of sedentary forms of leisure, and the blurriness of life regimens, which makes health a resource subject to constant “erosion” in everyday life [1, p. 10].

Under these conditions, the concept of “care of the self” acquires methodological significance for the pedagogy of physical education. In the scientific-pedagogical understanding, care of the self is not reduced to an individualistic attitude toward comfort; it is interpreted as a culturally mediated practice of self-build-

ing, including self-discipline, reflection, a responsible attitude toward the bodily and psychophysiological resource, and a readiness to maintain an optimal level of working capacity and viability [4, p. 43]. That is precisely why “care of the self” can be considered as a pedagogical “bridge” between values (the recognition of the importance of health) and actions (regular physical-culture and health-improving practices).

Objective of the study is to analyze in what way the concept of “care of the self” can act as an instrument of the physical education of the student youth of the city of Volgograd, and to substantiate the pedagogical guidelines ensuring the transition from the recognition of the value of health to regular practices of self-preserving behavior.

Methods and structure of the study. The study was carried out on the basis of a combination of general-scientific and pedagogical methods (analysis, synthesis, comparison, generalization, pedagogical



interpretation), as well as the sociological method of questionnaire surveying. The questionnaire survey had a one-time (cross-sectional) character and was conducted among the students of the educational organizations of the city of Volgograd.

The sample of the study amounts to 400 respondents aged 17–30. The instrumentarium of the study included questions about value attitudes and the self-assessment of the intensity of experiences, the frequency of actions, as well as a block recording the recognition of a number of everyday practices as socially significant (in particular, those connected with health, education, care of those around).

Results of the study and discussion. In the pedagogy of physical education, the question is fundamentally important: what internal foundations make practices of health stable rather than episodic [3, p. 18]. The concept of care of the self makes it possible to describe this foundation as the “internal infrastructure” of subjectness: a student maintains health not because “it is necessary,” but because he understands the bodily resource as a condition of educational success, professional fitness, quality of life, and social inclusion [5, p. 22]. In this logic, physical education ceases to be only a regulated discipline and becomes a technology of forming self-preserving behavior, built into everyday life.

The empirical data show that for the majority of the respondents, care of the self already has a pronounced socially significant dimension, which means that it can be used as a pedagogical resource for strengthening the motivation for regular motor activity and preventive practices.

The conducted questionnaire survey made it possible to reveal a significant contradiction between the intensity of subjectively significant attitudes and the frequency of their practical realization: strong/very strong experiences (in the original questionnaire – with regard to value-laden themes) were noted by 58.75% of the respondents, however regular actions were declared by only 25.25%; 49.5% act “sometimes,” and 25.25% – “rarely/never.” In the context of physical education, this structure of answers can be interpreted as a typical “gap between intention and behavior”: a student recognizes the importance of health, but does not maintain the regularity of practices (training routine, self-control of the sleep regimen, nutrition, prevention). Consequently, the task of physical education in the educational institutions of the region consists not only in the transfer of knowledge and norms, but

also in the construction of conditions under which care of the self becomes technologically “convenient”: accessible in time, understandable in structure, measurable by result, and supported by a community.

The most significant for the topic of the study is the block of answers about health and education as forms of care of the self. 75% of the respondents recognize that the care of one’s own health and education can be considered as a socially significant practice (in the original logic of the questionnaire – as socially useful and value-approved), with 42% choosing unconditional agreement and 33% – partial agreement. It is essential that the most widespread argumentation is connected not with private well-being, but with the functional connection of the personal resource and social usefulness: 42% directly indicate that health and education are the basis of the possibility of carrying out useful activity.

A clarifying question reinforces this conclusion: 82.25% of the respondents consider that the care of health influences the possibility of being useful to society; of them, 45% note that the influence is significant, and 37% – that it is rather pronounced. For physical education teachers this is fundamentally important: the care of health is legitimized by students as a value having an “external” effect (not only for oneself, but also for those around). Consequently, the motivational strategies of physical education can rely not exclusively on medical arguments (“it is so useful”), but on a broader socio-pedagogical frame (“health is a condition of educational, professional, and social productivity”). In practical terms, this means the need to shift the emphasis in the educational environment from one-time events to regular micro-practices: the planning of motor activity, the norming of loads, the culture of recovery, the prevention of overstrain [2, p. 59]. It is precisely these elements that constitute the content of care of the self as an instrument of physical education.

The results of the empirical study testify to the fact that the conceptions of the students of the hero-city of Volgograd regarding care of the self to a significant extent go beyond the framework of an individualistic interpretation and include a pronounced socially oriented component. Thus, 76.25% of the respondents indicate the social significance of the everyday care of those around (in the original instrumentarium – as part of value-approved practices), and 94.5% share the attitude of responsibility for the state of the natural environment and the rational use of resources.

The high level of support for constructive criticism



as a socially significant position (86.75%) should be interpreted not only as a characteristic of value orientations, but also as an indicator of the formedness of the reflexive resource of the students. In fact, the matter concerns the readiness of the student body to assess the quality of the educational and socio-cultural environment and to put forward proposals for its improvement. In the sphere of physical education, this circumstance sets a promising direction of pedagogical work, oriented toward strengthening the subject position of the students through project-based and research formats. Potentially productive in this respect can be the practices of monitoring the accessibility of sports infrastructure, the development and testing of student programs of motor activity.

The analysis of the rating of everyday practices that received the maximum assessments of significance (the share of "5" answers) makes it possible to state the dominance of normative-cultural foundations in the structure of the respondents' priorities. The highest indicators are recorded for the positions connected with a careful attitude toward cultural heritage and public spaces (81.5%), as well as with the observance of laws and respect for the rights of others (80.75%). A noticeable place is occupied by practices reflecting educational discipline and professional formation (53.25%). The care of one's own health and the well-being of those around is assessed as maximally significant by 50.25% of the study participants, whereas volunteer and social activity – by 46%, which indicates a somewhat more moderate expressiveness of attitudes toward participation in organized forms of prosocial activity while preserving the significance of individual-everyday contributions.

For the purposes of physical education, the revealed hierarchy sets a fundamentally important interpretive frame: health is recognized as a significant value, but in the structure of everyday priorities it yields to norms possessing a higher degree of symbolic and cultural consolidation. Consequently, the pedagogical strategy in the area of physical education must be oriented toward strengthening the semantic representation of health preservation – through its positioning as a cultural norm and at the same time as an element of professional responsibility. In this case, care of the self functions as a meaning-forming construct connecting the bodily dimension (the preservation and strengthening of health) with the normative one (self-discipline, the regulation of behavior) and the social one (social usefulness, responsibility toward others).

Conclusions. The concept of "care of the self" should be interpreted as an integrative pedagogical technology of the physical education of students, oriented toward the simultaneous solution of motivational and behavioral tasks. In this case, health is set not only as an individual value, but also as a functional resource of educational success, professional competence, and social effectiveness. Thereby a semantic motivation of participation in physical-culture and health-improving activity is formed, and a mechanism of behavioral stability is set, based on the regular reproduction of micro-practices of self-regulation and everyday motor activity.

The materials of the questionnaire survey of the student youth of the hero-city of Volgograd testify to the pedagogical productivity of the concept under consideration for the purposes of physical education. In the conceptions of the majority of the respondents, "care of the self" is correlated not only with personal well-being, but also with the possibility of preserving social capability and effectiveness in educational, professional, and communicative situations. At the same time, a characteristic contradiction is revealed between the expressiveness of value attitudes and the actual regularity of actions: the declared significance of health is not fully reinforced by stable everyday practices, which is manifested in the insufficient systematicity of motor activity and the deficit of self-regulation skills.

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Physical education as a way to overcome cultural barriers for foreign students

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Abstract

Objective of the study is to develop and test a complex of physical-culture and health-improving measures (team games, tourism, wordless exercises) aimed at removing the language, ethnic, and behavioural barriers of foreign students.

Methods and structure of the study. The organisation of the study was carried out under the conditions of the educational process in the discipline "Physical Education" at a higher educational institution. 80 foreign students studying at the university took part in the study.

Results and conclusions. In the course of the pedagogical experiment, an assessment was carried out of the effectiveness of the use of team relay races as a means of overcoming cultural barriers in foreign students. The results of the experiment proved the statistically significant advantage of the developed methodology.

Keywords: *physical education, foreign students, cultural barriers, social adaptation, intercultural communication, higher education, physical-education and sports activity.*

Introduction. The modern system of higher education is characterised by an increase in the number of foreign students in the educational institutions of various countries. Studying in a foreign cultural environment is accompanied by a number of difficulties, among which a special place is occupied by cultural barriers, conditioned by differences in traditions, norms of behaviour, language communication, and social attitudes [4, p. 3].

Objective of the study is to develop and test a complex of physical-culture and health-improving measures (team games, tourism, wordless exercises) aimed at removing the language, ethnic, and behavioural barriers of foreign students.

Physical education, possessing a universal and accessible character, acts as an important social instrument capable of uniting students of various nationalities regardless of the level of language preparation. Physical education occupies a special place in the system of the adaptation of foreign students under the conditions of a higher educational institution. The process of studying abroad is accompanied not only by the necessity of mastering new academic require-

ments, but also by the encounter with a different language, norms of behaviour, traditions, and social attitudes [1, p. 9; 3, p. 7].

Under the conditions of the university environment, physical education creates a special space of communication, where the basis of interaction becomes not only speech means, but also the joint performance of exercises, the observance of common rules, the coordination of actions, and the achievement of a common result. Physical education also fulfils an important educational and socio-cultural function. In the process of classes, foreign students master the norms of collective interaction, the principles of cooperation, mutual support, and responsibility for the common result. At the same time, they become acquainted with the sports traditions of the host country, which contributes to a deeper understanding of the features of the new socio-cultural environment [2, p. 12; 3, p. 15].

Team relay races occupy a special place in the system of physical-culture and health-improving work with foreign students. Their advantage lies in accessibility, universality, and a pronounced social orientation (Table 1). In the process of participating in relay races,



students are compelled to interact actively with one another, regardless of language and cultural differences, which contributes to the natural overcoming of communicative and psychological barriers [3, p. 87].

Methods and structure of the study. The organisation of the study was carried out under the conditions of the educational process in the discipline “Physical Education” at a higher educational institution. 80 foreign students studying at the university took part in the study. The subjects were distributed into two groups: a control group and an experimental group. In the control group, classes were conducted according to the traditional programme of physical education, whereas in the experimental group, team relay races and game exercises aimed at developing communication, cooperation, and intercultural interaction were additionally included in the educational process.

At the initial stage of the study, a primary diagnosis of the level of adaptation of the foreign students was carried out. Such indicators as communicative activity, the degree of inclusion in the collective, the level of intercultural interaction, psycho-emotional comfort, the feeling of social isolation, and the motivation for physical-education classes were assessed.

At the main stage, in the experimental group, team relay races, pair and group game tasks, exercises with a ball, combined relay races, and elements of national active games were systematically applied (Table 4).

At the final stage, a repeated diagnosis was carried out according to the same indicators as at the beginning of the study. The obtained results were compared with the initial data of the control and experimental groups and were subjected to mathematical-statistical processing.

This made it possible to assess the effectiveness of the use of team relay races as a pedagogical means of the social and cultural adaptation of foreign students under the conditions of a university (Tables 2, 3).

The content of the methodology included the conducting of classes aimed not only at the development of physical qualities, but also at the formation of communicative activity, cooperation, mutual assistance, and intercultural interaction. In the experimental group, team relay races with the passing of a ball, pair exercises, combined relay races, game tasks for interaction in a group, as well as elements of national active games, were used. The students were distributed into mixed teams, which made it possible to create conditions for communication between representatives of different cultures and to reduce the expressiveness of language and psychological barriers.

Results of the study and discussion. In the course of the pedagogical experiment, an assessment was carried out of the effectiveness of the use of team relay races as a means of overcoming cultural barriers in foreign students (Tables 2, 3). The comparative analysis of the results of the control and experimental groups made it possible to reveal a different dynamics of the studied indicators.

According to the data of the statistical processing, it can be noted that the changes in the control group had a positive but weakly expressed orientation. For all the studied criteria, the values of t_{emp} turned out to be below the critical level at $p \leq 0.05$, therefore the obtained differences do not make it possible to speak of a statistically confirmed effect. Most probably, the

Table 1. Role of team relay races in overcoming cultural barriers in foreign students

Type of team relay race	Brief description	Socio-cultural effect	Influence on the adaptation of foreign students
Relay races with running and passing an object	Participants take turns performing running tasks with the passing of a ball.	Formation of the skills of cooperation and trust.	Reduction of communicative barriers, development of informal communication.
Relay races with elements of national games	Inclusion of movements and tasks from different cultures.	Intercultural exchange, respect for the traditions of other countries.	Increase of interest in the culture of the host side and of other students.
Combined relay races	Combination of running, jumping, throwing, and coordination exercises.	Creation of equal conditions for participants with different levels of preparation.	Increase of self-confidence, reduction of the feeling of social isolation.
Relay races for interaction in a pair or group	Performance of tasks requiring synchronous actions.	Development of mutual assistance and team responsibility.	Strengthening of interpersonal ties and the feeling of belonging to the collective.
Game relay races	Relay races with elements of competition and play	Reduction of emotional tension, formation of a positive climate	Reduction of stress and anxiety in the new socio-cultural environment.



Table 2. Assessment of the effectiveness of team relay races in overcoming cultural barriers in the foreign students of the control group

Assessment indicator	Before the introduction of team relay races, %	After the introduction of team relay races, %	Dynamics of changes, %	$t_{\text{erit}} (p \leq 0.05)$
Level of communicative activity	42	49	+8	1.42
Degree of inclusion in the collective	45	52	+8	1.38
Level of intercultural interaction	39	46	+7	1.31
Psycho-emotional comfort	46	53	+7	1.27
Reduction of the feeling of social isolation	40	48	+8	1.34
Motivation for physical education	52	58	+7	1.29

Table 3. Assessment of the effectiveness of team relay races in overcoming cultural barriers in the foreign students of the experimental group

Assessment indicator	Before the introduction of team relay races, %	After the introduction of team relay races, %	Dynamics of changes, %	$t_{\text{erit}} (p \leq 0.05)$
Level of communicative activity	42	85	+43	2.05
Degree of inclusion in the collective	45	89	+44	2.05
Level of intercultural interaction	38	75	+37	2.09
Psycho-emotional comfort	47	79	+32	2.08
Reduction of the feeling of social isolation	40	75	+35	2.05
Motivation for participation in physical-education classes	52	87	+35	2.05

insignificant increase of the indicators in this group is connected with the natural habituation of the foreign students to the conditions of study, the study group, and the requirements of the educational environment.

In terms of the level of communicative activity in the control group, the indicator increased from 41 to 49%, that is, by 8%. However, $t_{\text{emp}} = 1.42$ turned out to be below $t_{\text{cr}} = 2.05$, which indicates the absence of reliable differences. In the experimental group, the growth was significantly more pronounced: the indicator rose from 42 to 85%, the deviation amounted to 43%. The value $t_{\text{emp}} = 4.86$ exceeded $t_{\text{cr}} = 2.05$, therefore a conclusion can be drawn about a statistically significant improvement of communicative activity.

In terms of the degree of inclusion in the collective, in the students of the control group a growth from 44 to 52% was observed, which amounted to 8%. At the

same time, $t_{\text{emp}} = 1.38$ did not reach the critical value $t_{\text{cr}} = 2.05$, consequently, this change is not statistically significant. In the experimental group, the indicator increased from 45 to 89%, and the deviation amounted to 44%. Since $t_{\text{emp}} = 5.12$ is higher than $t_{\text{cr}} = 2.05$, the revealed difference can be regarded as reliable.

In terms of the level of intercultural interaction in the control group, an increase from 39 to 46% was noted, that is, by 7%. However, the value $t_{\text{emp}} = 1.31$ turned out to be below $t_{\text{cr}} = 2.09$, therefore the difference does not have statistical reliability. In the experimental group, the indicator grew from 38 to 75%, the deviation amounted to 37%. At the same time, $t_{\text{emp}} = 4.21$ exceeded $t_{\text{cr}} = 2.09$, which confirms the significance of the obtained changes.

In terms of the indicator of psycho-emotional comfort in the control group, an increase from 46 to 53%



Table 4. Application of game technologies

Name of the relay race	Organisation and rules of conducting	Equipment	Developed qualities	Adaptation effect
Passing the relay (ball)	Participants line up in a column. On the signal, the first runs to the marker, returns, and passes the baton to the next.	Ball, cones	Attention, responsibility, interaction	Reduction of the language barrier, development of trust
“Snake” run	The participant runs around the placed cones and passes the relay to the next.	Cones	Coordination, orientation in space	Formation of confidence and inclusion
Pair relay race with a ball	Two participants clamp a ball between themselves and cover the distance without using their hands.	Ball	Cooperation, sense of the partner	Development of interpersonal contact
“Carry the object” relay race	The participant carries an object (ball, hoop) in a set way.	Ball, hoop	Self-control, precision	Reduction of anxiety
“Assemble the team” relay race	Each participant in turn runs to the centre and takes an element; at the end a common object is assembled.	Cubes, tokens	Collective thinking	Formation of team identity
Relay race with elements of national games	Inclusion of simple movements from the traditional games of different countries.	Various equipment	Interest in culture	Intercultural dialogue

was recorded, which corresponds to a deviation of 7%. The value $t_{emp} = 1.27$ did not exceed $t_{cr} = 2.08$, therefore this difference cannot be considered reliable. In the experimental group, the indicator rose from 47 to 79%, and the deviation amounted to 32%. With $t_{emp} = 3.84$, exceeding $t_{cr} = 2.08$, the difference is statistically significant.

In terms of the reduction of the feeling of social isolation in the control group, the indicator changed from 41 to 48%, the deviation amounted to 7%. Since $t_{emp} = 1.34$ is below $t_{cr} = 2.05$, the difference does not reach the level of statistical significance. In the experimental group, the indicator increased from 40 to 75%, which corresponds to a deviation of 35%. The value $t_{emp} = 4.03$ exceeded $t_{cr} = 2.05$, therefore the revealed changes are reliable.

In terms of the motivation for participation in physical-education classes in the control group, a growth from 51 to 58% was noted, that is, by 7%. However, $t_{emp} = 1.29$ turned out to be less than $t_{cr} = 2.05$, therefore the difference is not statistically confirmed. In the experimental group, the indicator increased from 52 to 87%, the deviation amounted to 35%. With $t_{emp} = 4.17$, exceeding $t_{cr} = 2.05$, one can speak of a reliable increase of motivation.

Conclusions. The conducted study confirmed that physical education is an effective way of overcoming cultural barriers in foreign students. The use of team relay races, game exercises, and elements of national active games creates a universal communicative space, where language, ethnic, and behavioural differences cease to be an obstacle to interaction.

The results of the experiment proved the statistically significant advantage of the developed methodology. In the experimental group, where team relay races were applied, all the indicators of adaptation grew by 32–44% ($t_{emp} > t_{cr}$), whereas in the control group, which studied according to the traditional programme, the changes did not exceed 6–8% and did not reach statistical reliability ($t_{emp} < t_{cr}$). The most pronounced effect was recorded in the growth of communicative activity (+43%), inclusion in the collective (+44%), and motivation for classes (+35%).

Thus, the systematic application of team relay races and game technologies in mixed groups is recommended as an effective means of the socio-cultural adaptation of foreign students.

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Assessment of students' coordination abilities for mastering complex spatiotemporal skills

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Abstract

Objective of the study is to assess the coordination abilities of students of managerial specialties for mastering complex spatiotemporal skills using standardized testing tools.

Methods and structure of the study. The study participants (83 first- and second-year students of managerial specialties) performed standardized tests of spatial coordination. The standard deviation, the reliability level of the tests, and the factor loadings were calculated.

Results and conclusions. The factor structure of students' coordination abilities was revealed; it includes the ability to orient in space and lateral agility, which explain 75.4% of the coordination abilities of students of managerial specialties.

Keywords: *students, coordination abilities, spatial orientation, lateral agility.*

Introduction. Human coordination abilities are closely related to other physical qualities that determine the success of learning technical actions and the realization of motor skills under variable conditions of physical culture and sports activity. Coordination abilities, most successfully developed at a young age, determine the comprehensive physical development of the personality [4].

It is expected that specialists in the selection and training of personnel will be able to form certain coordination-motor skills of employees, relying on their own motor experience [2]. Therefore, studying the ability of students of managerial specialties to master complex coordination structures contributes to the selection of content and the expansion of opportunities for improving the physical condition of the trainees themselves and the subjects of their future professional activity [1].

Considering that diagnostic procedures in the field of movement coordination are quite complex, conducting research with the aim of diagnosing students' coordination abilities will serve as a basis for introduc-

ing the technology of mass personalization of physical education at a higher educational institution [3].

Diagnostic procedures for studying students' coordination abilities should be feasible without complex and expensive equipment in the conditions of practical physical education classes [5].

Objective of the study is to assess the coordination abilities of students of managerial specialties for mastering complex spatiotemporal skills using standardized testing tools.

Methods and structure of the study. The sample of study participants consisted of 83 first- and second-year students of managerial specialties aged 19.5 ± 0.8 years.

The study was conducted by performing a set of standardized tests of spatial coordination, manifested in the ability to change modes and direction of movement (running with changes in body positions and directions of movement); to change the speed of movement in a non-standard way (passing the perimeter of a polygon backwards); and to quickly change lateral movements (performing side steps). The subjects



participated most actively in the exercise of moving with side steps and passing the perimeter of the polygon.

The analysis of the test results was carried out in order to determine their informativeness in assessing the coordination abilities of first-year students.

The test results were processed in the Statistica 12.0 package. The main statistical parameters and the coefficient of internal consistency (reliability) of the tests – Cronbach's (α) – were calculated.

The factor structure of the tests was determined. The factor loadings were normalized according to the Varimax criterion.

Results of the study and discussion. Testing of the normality of distribution showed a significant deviation from the normal distribution only in the third exercise – passing the perimeter of the polygon backwards. A significant improvement in the average results during the third attempt caused a substantial deviation of a number of data from the normal distribution with a shift of the kurtosis values to the right (Table 1).

As the number of attempts to perform the exercises increased, the results improved. Although the exercises performed were quite well mastered by the students, the improvement in results probably occurred not as a result of the immediate improvement of the coordination structure, but as a result of pedagogical stimulation on the part of the teacher. The influence of the participants' determination to achieve high personal results should also be taken into account.

The high reliability of the tests is confirmed by the value of Cronbach's alpha coefficient (α) as an indicator of internal reliability. The reliability coefficients are quite high (>0.80), which is considered a satisfactory confidence interval.

The values of the average correlation between the results of performing the exercises are also satisfactory, with a high correlation of the results of the attempts in running with changes in body positions and directions of movement (0.91), passing the perimeter of the polygon backwards (0.86), and the test of performing side steps (0.78).

The factor analysis revealed two key factors that explain approximately 75.4% of the variance of the correlation matrix of the data. The principal component method made it possible to identify commonalities of objects, indicating the existence of at least two factors forming the structure of students' coordination abilities.

The factor structure revealed on the basis of the principal component criterion clearly demonstrates that the integration of the results of performing all three tests into one principal component (a single factor) did not occur. As a result of the factor analysis, two factors were identified.

The first factor included the exercises in running with changes in body positions and directions of movement. This factor presupposes mastering the ability to move and control body movements in space, therefore it can be identified as the factor of the ability to orient in space.

The exercise of performing lateral movements describes the second factor of coordination, which presupposes a rapid lateral change in the direction of movement, which classifies it as the factor of lateral agility. During lateral displacements, the abilities to maintain body balance in unstable positions and to create force at various angles are in demand.

Considering the specificity of the diagnostic tests, the representativeness of the revealed factors is determined by the latent structure of coordination abilities.

Table 1. Results of performing the exercises, standard deviation, the reliability level of the tests, factor loadings

Exercise	N	$x \pm sd$	α	F-1	F-2
Running with changes in body positions and directions of movement, s	1	21.37 $\pm$ 2.56	0.91	0.73	0.16
	2	20.88 $\pm$ 1.45			
	3	20.43 $\pm$ 2.26			
Passing the perimeter of the polygon backwards, s	1	15.45 $\pm$ 3.14	0.86	0.71	0.23
	2	13.41 $\pm$ 2.36			
	3	13.06 $\pm$ 2.70			
Performing side steps, s	1	11.83 $\pm$ 1.39	0.78	0.25	0.94
	2	11.41 $\pm$ 1.27			
	3	11.13 $\pm$ 1.35			

Note: N – attempt number; α – Cronbach's alpha coefficient; F-1 – first factor; F-2 – second factor.



Since the exercises used in the study showed high reliability and validity, they can be considered standardized tests for assessing the coordination abilities of students of managerial specialties.

Conclusions. The coordination ability tests used are characterized by sufficient validity and are suitable for practical use in the process of physical education of students of managerial specialties. The factor model of spatial coordination includes the ability to orient in space and lateral agility, which explain 75.4% of the coordination abilities of students of managerial specialties. The structuring of two factors determines the directions for improving the coordination abilities of students of managerial specialties – the ability to move and control body movements in space and lateral agility.

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Application of the monitoring module in the educational process of universities

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Abstract

Objective of the study is substantiation and implementation of the module for monitoring the level of physical fitness of university students in the educational process.

Methods and structure of the study. Within the framework of this study, a comprehensive methodological toolkit was used to achieve the set goals, including a review of specialized literature and legal acts, a questionnaire survey, and analytical modeling. The study was conducted in two consecutive stages. In the first stage, a detailed analysis of the use of digital technologies in educational activities by leading universities in St. Petersburg was conducted. In the second stage, the need for the development and implementation of a module for monitoring students' physical fitness was identified, and a methodological framework for its operation was developed.

Results and conclusions. The implementation of a module for monitoring the physical fitness level of university students is an innovative approach to optimizing the physical education process. This module, integrated into the educational program system, aims to enhance the effectiveness of physical training and transition from traditional normative methods to individualized, person-centered strategies, which not only improves the physical condition of students but also fosters a conscious attitude towards a healthy lifestyle.

Keywords: *module, analysis and monitoring, physical training, educational process, higher education institutions, accounting, teaching, methodology.*

Introduction. In 2024, the Government of the Russian Federation approved the State Program "Development of Physical Culture and Sports," which covers the period up to 2030 and provides for strategic planning until 2036 (hereinafter referred to as the Program). The main target indicators of the Program include increasing the proportion of citizens who regularly engage in physical activity to 70%, improving the satisfaction level of the population with the created conditions for sports activities to 70%, and achieving a 74% provision of sports facilities for the population.

One of the key areas of implementation of the State Program "Development of Physical Culture and Sports in the Russian Federation", approved by the Decree of the Government of the Russian Federation dated September 30, 2021, No. 1661, is the digital transformation of the management system of the physical culture and sports sphere.

When determining the indicators of the Program, students of higher educational institutions are included in the category of citizens who systematically engage in physical culture. Four years of study under bachelor's programs and five years under specialist programs represent a long period during which the priority task of students is educational activities, which take up a significant part of their time. Attendance at physical education classes integrated into the curriculum allows students to participate in physical activity on a regular basis. If the educational institution has a well-developed sports infrastructure, including rented facilities, students are likely to be satisfied with the conditions for physical activity during their studies. In light of the requirements of the State Program, the implementation of digital technologies for monitoring the physical fitness level of university students has become an urgent task.

The relevance of the study is determined by the urgent need for systematic monitoring of the physical



fitness level of students in higher education institutions. This aspect becomes particularly important in the context of current trends in education and health-care, which aim to improve the quality of professional training and enhance the physical health of students.

Objective of the study is substantiation and implementation of the module for monitoring the level of physical fitness of university students in the educational process.

Methods and structure of the study. The organization of research work was carried out in two consecutive stages, each of which had its own specific goal and methodological focus. The first stage involved a detailed analysis of the use of digital information technologies in the process of physical education for students, with a focus on studying the best practices of leading educational institutions in the country. During this stage, innovative approaches were examined in prestigious educational institutions such as the Russian Presidential Academy of National Economy, the Herzen State Pedagogical University of Russia, the Military Academy of Communications, and the Military Institute of Physical Education. The main objective of the first stage was to systematically identify and classify software products used in the educational processes of higher education institutions, as well as to determine the need for the development of specialized software for monitoring the physical fitness level of students.

The second stage of the study focused on the justification and development of a methodology for monitoring the physical fitness level of students. When developing this methodology and organizing the study, it was taken into account that in order to increase the attractiveness of physical education and motivate students, it is necessary to have a comprehensive impact on the cognitive and creative aspects of the physical development process. The cognitive component implies the conscious and meaningful assimilation of the educational material, while the creative component implies the creative assimilation of the educational material. This approach can be effectively implemented by involving students in the independent monitoring of their physical condition, which is achieved through a comparative analysis of the dynamics of the development of physical qualities [2]. The form of monitoring plays a key role in the educational process, as its methodology should be aimed at stimulating the cognitive activity of students. In addition, the introduction of advanced technologies into the education-

al process is driven by current trends and increased requirements for the level of professional competence of graduates of higher education institutions [1]. This format can be an electronic software product that provides access to its functionality through various computing devices, including personal computers, tablet computers, and mobile phones.

Results of the study and discussion. The analysis of scientific literature and the study of best practices by leading universities, as well as legal acts, conducted as part of the first stage of the study, demonstrated that currently, only in the context of military educational organizations, there are a number of software products designed to analyze the level of physical development and physical fitness of military personnel. These include, for example, the "Military Personnel Passport" and the "Software Module for Systematization and Control of the Physical Fitness Level of Military Personnel," developed by the Military Academy of Communications and the Military Institute of Physical Culture, respectively. Although these software solutions are limited in scope, they are nevertheless used in a number of other military educational institutions. In contrast, higher education institutions typically use electronic packages, databases, and resources recommended by the Ministry of Science and Higher Education of the Russian Federation. These resources include "Portfolio", "Abiturient" and various electronic library systems such as "Lan", "Urait", "Znaniy", "IPRSMART" and Google Academy. However, these resources are not designed for analyzing and effectively influencing the level of physical fitness of students, which significantly limits their functionality in this context.

There are several approaches to recording attendance, academic performance, and evaluating students' compliance with standards. One approach, used by several universities, involves using tablets to capture relevant information. These tablets may have separate sections for each student, academic group, or course. However, while they offer the ability to store data, they lack the functionality to accumulate information, determine grades based on exercise performance, and conduct monitoring. In most cases, information about attendance and academic performance is recorded by teachers in handwritten journals, and grades for completing нормативов are assigned based on comparing the results with printed tables. It is important to note that there are currently no methodological recommendations for developing physical



qualities in students in the form of electronic products. Although most universities have developed and use electronic journals, video lessons, and presentation materials for physical education, these resources typically mimic paper journals for tracking attendance and academic performance of study groups and provide information only at the group level. There is no summary information on study groups, courses, years of study, and the level of physical development. This information would be extremely useful for analytical accounting, comparative analysis, and control and management of the physical training process for students.

Based on the analysis conducted in the first stage, it can be concluded that there is an urgent need to develop and implement an electronic software module for monitoring the physical fitness level of students in higher education institutions. This module should be integrated into the existing educational management system and contribute to improving the effectiveness of students' physical training.

The second stage of the study focused on developing a methodology for the module's operation and evaluating its potential effectiveness. During this stage, a questionnaire was conducted among faculty members of physical education departments in two educational institutions. A total of 34 employees participated in the survey. The results of the survey showed that 84% of respondents support the idea of introducing a monitoring module into the educational process. The main arguments in favor of this innovation include the need to encourage students' physical activity and the fact that teachers are already entering data into the university's electronic database when filling out electronic journals.

The monitoring module is a comprehensive system of electronic software products for computers that functions based on the integration of hardware and software components. This system provides processing and structuring of the entered data according to the specified parameters, as well as allows determining key indicators of students' physical fitness in accordance with the technical requirements [3].

The module for monitoring the level of physical fitness of students can function as a standalone electronic product or be integrated into a more extensive module for systematizing and monitoring physical training, which was discussed in detail in a previous publication.

At the first stage of the study, it was found that in a number of military educational institutions, the module

for monitoring physical training is integrated into comprehensive software solutions such as the "Military Personnel Passport". Physical education teachers, both in military and civilian universities, are required to maintain electronic journals that, in addition to attendance records, also include the results of exercises that reflect the development of students' physical qualities. One of the significant advantages of using this module is a significant reduction in the teacher's time spent on administrative functions. This time savings is achieved through automated data processing, where the program calculates the scores automatically after entering the exercise results, eliminating the need for manual comparison with the normative tables. Additionally, the module provides comprehensive analytical information, including the group's average score, the percentage of positive and negative scores for each physical quality, the overall course average score, and the assessment of the development level of each physical parameter. Research conducted in military educational institutions has shown that the implementation of such technological solutions can reduce a teacher's time requirements by 10-15% compared to traditional paper-based accounting methods.

The study found that the implementation of a module for monitoring students' physical fitness levels will contribute to:

- academic performance should be monitored individually for each student, as well as for academic groups, courses, and faculties;
- monitoring students' academic performance for each semester and academic year;
- effective planning of the educational process;
- objective and individual control of the level of knowledge acquisition, as well as the formation of skills and abilities;
- systematic adjustment of means and methods of developing physical qualities;
- promoting the participants' motivation to achieve positive results in their activities;
- making adjustments to the exercise scores as needed;
- conducting a comparative analysis of the dynamics of physical quality development, academic performance, and student attendance during semesters and academic years;
- prompt response to the insufficient level of physical training among students and appropriate adjustments to the educational process, including individualization of educational methods.



For heads of physical education departments, it is crucial to provide quick and easy access to information about teachers' activities, as well as the ability to conduct a comprehensive assessment of their performance. The implementation of a module that meets the requirements of the teaching staff (such as providing students with access at least once a month) involves the integration of modern learning technologies. Students can use mobile devices like smartphones, tablets, or laptops to access the digital module's data. The information presented in the module provides teachers and students with the opportunity to not only receive, but also compare their results with those achieved in other groups and courses. The automatic data processing implemented in the module contributes to significant time savings and reduced physical effort on the part of the teacher, which is an important aspect of optimizing the learning process and increasing its efficiency.

Conclusions. The introduction of electronic software products into the educational process in the discipline "Physical Education" is a significant factor contributing to the improvement of the quality of education. The module for monitoring the level of physical fitness of students in higher education institutions, although it is not a mandatory element of the educational and methodological complex of the departments, has the potential to transform the educational activities in the discipline "Physical Training" to a qualitatively new level. The main goal of digital electronic programs is to expand the range of opportunities for teachers, which contributes to the more effective achievement

of educational goals. In the context of using the monitoring module for teaching staff, its task is to optimize the time spent on processing information, which in turn allows teachers to focus on better preparation for classes, as well as to increase the time allocated for scientific and methodological activities, as well as for conducting individual work with students. For students, the monitoring module serves as an incentive to improve their physical fitness levels, which is an important aspect in the context of their physical health and overall physical culture. Thus, the integration of electronic software products and a monitoring module into the physical education educational process is an innovative approach aimed at improving the efficiency and quality of teaching, as well as encouraging students to actively participate in the physical education process.

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Overcoming the obstacle course by university students as a way to increase motor activity

UDC 371.134



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Abstract

Objective of the study is development and integration of specialized obstacle course training for students of military age based on simulation methods into the educational process.

Methods and structure of the study. This article analyzes the aspects of preparing students for service in the Armed Forces of the Russian Federation. To achieve these goals, the following methodological approaches were used: an analytical review of scientific literature, data collection and systematization, and mathematical processing of the research results.

Results and conclusions. The integration of specialized obstacle course training into the curriculum of the discipline "Elective Courses in Physical Education" for senior students is aimed at developing their comprehensive motor skills, as well as at forming applied competencies and improving their physical fitness.

Keywords: *obstacle course, educational activities, draft age, military training, physical activity, applied skills.*

Introduction. Overcoming obstacles is a key component of the physical training of military personnel serving in the Armed Forces of the Russian Federation, including senior students. Performing exercises on an obstacle course, such as running, jumping, crawling over various obstacles, jumping into and out of trenches, throwing grenades, and others, not only helps to develop basic physical qualities, including speed, strength, endurance, and coordination, but also helps to form and strengthen the willpower of the participants in the training process.

Objective of the study is development and integration of specialized obstacle course training for students of military age based on simulation methods into the educational process.

The purposes of the study are:

- optimization of methods for overcoming obstacles;

- selection of methods and tools for developing running, jumping, and speed-strength training;

- implementation of the developed method for overcoming obstacles;

- evaluation of the effectiveness of integrating obstacle course exercises into the physical training program for students.

Methods and structure of the study. At the initial stage of the study, a methodology for modeling an obstacle course for a 50x30-meter gymnasium was developed through a thorough analysis of specialized literature on the subject (Fig. 1). This obstacle course was created to provide comprehensive training for key motor skills such as speed, strength, coordination, and endurance in a realistic environment. The designed obstacle course design allows for effective simulation of specific tactical tasks, including rapid movement, firing from a kneeling position, overcoming

destroyed structures, overcoming natural and artificial obstacles, as well as performing a prone movement in simulated gas attack conditions. [1]. At the end of the course, students perform a set of self-defense exercises using a simulated enemy [4].

The main elements of the obstacle course are the following structural components: a high-speed running area, a tactical field for moving in a kneeling position at a distance of 30 meters, a moat 2 meters wide (equivalent to three gym mats), a maze 8 meters long and 2 meters wide, a trench 1 meter wide (gym mat), another a trench of similar width, a destroyed bridge consisting of four sections of gymnastic benches with a gap of 1 meter and a bend at an angle of 135 degrees, a soft-surfaced section with a length of 6-8 meters and a platform for performing a complex of hand-to-hand combat within the framework of eight accounts.

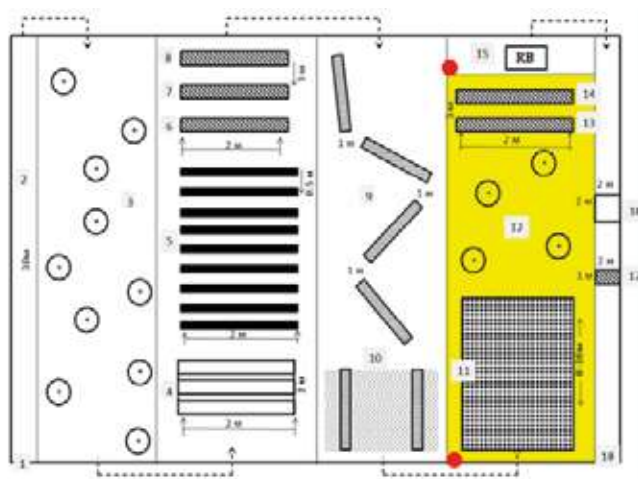


Figure 1. Complex obstacle course in a sports hall
Legend:

1. Line of the beginning of the lane
2. Speed running section
3. Tactical field, movement on the tactical field with the preparation of an imitation for shooting from the knee (30 m)
4. A ditch 2 m wide (3 gymnastic mats)
5. Labyrinth 8 m long, 2 m wide
6. Trench 1 m wide (gym mat)
7. Trench 1 m wide (gym mat)
8. Trench 1 m wide (gym mat)
9. A destroyed bridge consisting of 4 segments (gymnastic benches with a gap between them - 1 m) with a bend of 135°.
10. A destroyed staircase (2 gymnastic benches, the distance between the benches is 3 m) with an imitation of an infected section of the obstacle course,

where all elements are performed in a medical mask (gas mask).

11. Area with a soft surface of 6 – 8 m.
12. Area for movement in the ready for shooting from the knee.
- 13 -14. Trench.
15. A platform for performing a complex of hand-to-hand combat for 8 counts.
16. A ditch (3 gymnastic mats) 2 m wide.
17. Trench (gymnastic mat) 1 m wide.
18. End of the obstacle course.

As part of the first stage, methodological recommendations were developed for performing exercises on a single obstacle course:

1. The beginning of the obstacle course ("start") is performed by students from a high start [2].
2. The speed run section is performed at a medium pace.
3. The tactical field. Movement through the tactical field in a combat stance for kneeling shooting is performed at high speed. The knee should be lowered at the designated marker, the arms should be raised to simulate shooting from a kneeling position, and the back should remain straight.
4. To overcome the obstacle in the form of a moat, take a running start with one push-off leg. Ensure that the thigh is raised as high as possible during the running start. Land on a semi-crouched leg.
5. To overcome the maze, use side steps followed by a forward stride.
- 6,7,8. The trench is crossed using a running step.
9. When performing the exercise of crossing a destroyed bridge, it is necessary to bend the legs at the knee joints and tilt the body forward to ensure stable balance on the gymnastics bench.
10. To cross a destroyed staircase, it is recommended to use a side step with both feet in contact with the surface of the gymnastics bench. It is important to lift the thigh as high as possible to ensure stability and efficiency of the movement.
- Overcoming the "infected" section of the obstacle course.
11. Moving through the infected section of the obstacle course using a medical mask (gas mask) on a soft surface 8-10 meters long.
12. The task of overcoming the tactical field is performed using personal respiratory protection equipment, namely a mask (gas mask), in a kneeling position.



13-14. Overcoming trench sections is carried out in personal respiratory protection equipment (gas mask).

15. Complex of technical actions in the system of hand-to-hand combat without the use of weapons, on eight counts.

The starting position is a military stance.

"One" - take a fighting stance with your left leg forward.

"Two" - perform a left-handed upward chop and a forward right-handed straight punch.

"Three" - perform a forward right-legged straight or low kick.

"Four" - take a step to the side with your right leg and perform a diagonal right-handed palm-wedge punch.

"Five" - take a step back with your right leg and perform a left-handed inward chop.

"Six" - with a step forward with the right foot, perform a straight punch with the right fist from above.

"Seven" - perform a straight kick with the left foot forward and return to the left-handed combat stance.

"Eight" - deliver a knee strike with the right leg, while simultaneously grabbing and pulling the opponent towards you, then return to the combat stance and return to the starting position of the military stance with a step back with the left foot [3].

16. Crossing the moat with a running stride, followed by landing on a semi-bent leg.

17. Crossing the trench with a running stride, accelerating towards the finish line.

18. Finishing the obstacle course.

As part of the second stage of the research, the effectiveness of using exercises with an artificially created obstacle course and a set of hand-to-hand combat techniques was evaluated.

Results of the study and discussion. During the first semester of the 2024-2025 academic year, physical education classes were held for third-year students of the "Journalism" and "Economic Security" programs, with a total of more than 150 students. The effectiveness of the program was evaluated based on the heart rate (HR) at the beginning (September 2024) and end (December 2024) of the experiment, as well as the subjective assessment of the self-defense complex, expressed in points. The test results are presented in Table 1.

Table 1. Heart rate and exercise performance scores at the beginning and end of the experiment.

No.

Indicators		Before the experiment, s		
		At the end of the experiment, s		
		Difference		
1	Heart rate (bd, min)	153	140	21
2	Performance of the complex (in points)	3,2		
4,1		0,9		

As a result of the study, a significant improvement in heart rate (HR) was observed, with an increase of 13 beats per minute. Additionally, the assessment of the performance of unarmed hand-to-hand combat techniques increased by 0.9 points. These results demonstrate the effectiveness of incorporating simulated obstacle courses into the educational process for students as part of the "Elective Physical Education" course. The classes had a positive impact on the overall physical fitness of the students, as evidenced by improvements in the performance indicators included in the зачетную программу: 100-meter run, Cooper test, standing long jump, and flexibility exercises. Overall, there was an improvement in the development of physical qualities such as agility, speed, and endurance, which confirms the effectiveness of the developed physical training methodology for students.

Conclusions. The use of the simulated obstacle course we have developed as part of physical education classes at the North-Western Institute of Management of the Russian Presidential Academy of National Economy and Public Administration demonstrates its high effectiveness in solving both applied physical training and improving students' overall physical condition.

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Dynamics of the value orientations of students – future coaches in the process of professional training

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Abstract

Objective of the study is to study the dynamics of the structure of value orientations among students – future coaches at the initial and final stages of professional education.

Methods and structure of the study. The respondents of the study were students – future coaches of the first and senior years, studying at the Federal State Autonomous Educational Institution of Higher Education “Northern (Arctic) Federal University named after M.V. Lomonosov.” To study the value orientations of students – future coaches, the method “Free Choice of Values” (E.B. Fantalova) was applied, which makes it possible to assess various life values by the criteria of importance (how significant the value is) and attainability. The factor structure of the value orientations was determined using factor analysis (method: Varimax) with Kaiser normalization.

Results and conclusions. The conducted study made it possible to identify significant changes in the factor structure of the value orientations among students – future coaches from the initial to the final stage of professional education. It was established that at the initial stage of professional education the factor “Importance of life values” dominates, whereas at the final stage of professional education the factor “Attainability of life values” comes to the fore, which may testify to the transition from an idealistic perception of life values to a realistic assessment of the possibilities of their attainability. Changes also occur in the content of the factors themselves: a shift of value orientations from individual-hedonistic to socially significant and professional ones by the end of professional education. The obtained results can be used for the psychological-pedagogical support of the preparation of future coaches and the improvement of the system of their professional education.

Keywords: *students – future coaches, value orientations, youth age.*

Introduction. The prospects for the development of modern sport are closely connected with the processes of the personal formation of athletes, including the formation of the system of their value orientations. There are scientific studies devoted to the study of the value orientations of athletes from the sports reserve [4], to the characterization of the personality profiles and value orientations of athletes professionally engaged in various sports [3], to the analysis of values of a patriotic and civic orientation among athletes [6] and student athletes [2], and others. These studies emphasize the importance of forming a system of value orientations for achieving high sports results.

The process of the formation of an athlete’s system of values is greatly influenced by the sports coach, for

whom the qualities of his own personality are the main instrument of pedagogical influence. An important stage in the formation of the personal characteristics of a coach, including his value orientations, is the period of professional education, which, as a rule, coincides with youth age. Youth is characterized by active personal and social formation, the formation of self-awareness and worldview, the development of skills of reflection on life experience and self-determination [1]. All these processes are the basis for the formation of the value orientations of students – future coaches. For the high-quality preparation of future coaches, it is important to understand the changes in the system of their value orientations at different stages of professional education. That is precisely why a study of the



dynamics of the structure of value orientations among students – future coaches at the initial and final stages of professional preparation is of interest. Most of the studies currently existing are aimed at identifying the key value orientations among student athletes, while insufficient attention is paid to the problem of studying the dynamics of value orientations during the period of their professional education.

Objective of the study is to study the dynamics of the structure of value orientations among students – future coaches at the initial and final stages of professional education.

Methods and structure of the study. To study the value orientations of students – future coaches, the method “Free Choice of Values” (E.B. Fantalova) was applied [5]. The respondents were offered a list of more than 70 different life values, each of which had to be assessed on a 10-point scale by two criteria: by the criterion of importance (how significant the value is) and by the criterion of attainability (how much the given value is subjectively felt as “attainable,” “realizable”). In order to identify the factor structure of the value orientations of youth-age athletes, factor analysis (Varimax) with Kaiser normalization was used; factors with eigenvalues greater than 1 were retained (taking into account the scree plot criterion), and the number of factors was determined by the breaking point on the graph of eigenvalues. The respondents of the study were students – future coaches numbering 60 people: 50% first-year students (average age – 17.6 ± 1.2), 50% – senior students (average age – 20.5 ± 1.5). The study was conducted on the basis of the Federal State Autonomous Educational Institution of Higher Education “Northern (Arctic) Federal University named after M.V. Lomonosov” in 2025.

Results of the study and discussion. As a result of the conducted analysis, it was revealed that among students – future coaches at the initial stage of professional education (Table 1), the informativeness of the identified factors (total variance) in the structure of their value orientations amounted to 74% ($KMO=0.92$, $=17235.128$ at $p=000$) and is represented by 15 factors; however, only 2 of them had an informativeness of more than 10%.

The first, most substantial factor (25.1%) of the structure of the value orientations of students – future coaches at the initial stage of professional education, which can be designated as “Importance of life values,” included such values by the criterion of their importance as “mutual support and mutual assistance” (0.873); “materially secure life” (0.869); “health” (0.867); “personal freedom and security” (0.854); “entertainment” (0.841).

The second factor by content (16%) of the structure of the value orientations of students – future coaches at the initial stage of professional education, which can be designated as “Attainability of life values,” included such values by the criterion of their attainability (realizability) as “health” (0.782); “personal freedom and security” (0.78); “materially secure life” (0.76); “self-confidence” (0.74); “work and professional realization” (0.72).

It was established that among students – future coaches at the final stage of professional education (Table 2), the informativeness of the identified factors (total variance) in the structure of their value orientations amounted to 72% ($KMO=0.894$, $\chi^2=15481.504$ at $p=000$) and is also represented by 15 factors. Just as in the factor structure of the value orientations among students – future coaches at the initial stage of

Table 1. Factor structure of the value orientations among students – future coaches at the initial stage of professional education

General leading factors (informativeness, %)	Variables forming the factors	Factor loading
First factor “Importance of life values” 25.1%	“Mutual support and mutual assistance”	0.873
	“Materially secure life”	0.869
	“Health”	0.867
	“Personal freedom and security”	0.854
	“Entertainment”	0.841
Second factor “Attainability of life values” 16%	“Health”	0.782
	“Personal freedom and security”	0.78
	“Materially secure life”	0.76
	“Self-confidence”	0.74
	“Work and professional realization”	0.72



Table 2. Factor structure of the value orientations among students – future coaches at the final stage of professional education

General leading factors (informativeness, %)	Variables forming the factors	Factor loading
First factor "Attainability of life values" 18.5%	"Personal freedom and security"	0.83
	"Health"	0.81
	"Rights and freedoms of the person and citizen"	0.8
	"Ecology"	0.78
	"Work and professional realization"	0.77
Second factor "Importance of life values" 17.5%	"Health"	0.88
	"Personal freedom and security"	0.86
	"Mutual support and mutual assistance"	0.84
	"Self-confidence"	0.83
	"Productive active life"	0.82

professional education, only 2 factors had an informativeness of more than 10%.

The first, most substantial factor (18.5%) of the structure of the value orientations of students – future coaches at the final stage of professional education, which can be designated as "Attainability of life values," included such values by the criterion of their attainability (realizability) as "personal freedom and security" (0.83); "health" (0.81); "rights and freedoms of the person and citizen" (0.8); "ecology" (0.78); "work and professional realization" (0.77).

The second factor by content (17.5%) of the structure of the value orientations of students – future coaches at the final stage of professional education, which can be designated as "Importance of life values," included such values by the criterion of their importance as "health" (0.88); "personal freedom and security" (0.86); "mutual support and mutual assistance" (0.84); "self-confidence" (0.83); "productive active life" (0.82).

According to the results of the conducted analysis, a change in the priority of the leading factors of the general structure of the value orientations of students – future coaches is noted: at the initial stage of professional education the factor "Importance of life values" (25.1%) dominates, whereas at the final stage of professional education the factor "Attainability of life values" (18.5%) comes to the fore, which, in our opinion, may testify to the transition from an idealistic perception of life values to a realistic assessment of the possibilities of their attainability. This reflects the formation of a more mature, practice-oriented worldview among students – future coaches by

the end of professional education. Changes occur in the content of the factors themselves: in the structure of the value orientations of students – future coaches at the initial stage of professional education, pragmatic-hedonistic values predominate – material well-being (0.869), entertainment (0.841) are among the priorities by importance, which reflects the orientation, characteristic of this age, toward the satisfaction of personal needs and the obtaining of pleasure from life. Whereas among students – future coaches at the final stage of professional education, a significant expansion of the value horizon is observed: among the leading factors there appear such socially oriented values as the rights and freedoms of the person (0.8), ecology (0.78), and professional realization (0.77), which indicates the formation of a more mature worldview and social position. In our opinion, this may indicate a certain shift of value orientations from individual-hedonistic to socially significant and professional ones by the end of professional education. A convergence of the informativeness of the two leading factors among students – future coaches at the final stage of professional education occurs (from 9.1% to 1%), which may indicate a more balanced perception of both criteria of values (both importance and attainability) by the end of professional education.

Conclusions. The conducted study confirmed the put-forward assumption about the presence of dynamics of value orientations among students – future coaches during the transition from the initial to the final stage of professional preparation, and made it possible to identify significant changes not only in the priority of values from pragmatic-hedonistic to so-



cially oriented, but also in the mechanisms of subjective value perception – from an idealistic perception of the importance of values to a more mature, practice-oriented focus on their attainability, which testifies to the natural process of the formation of the value-semantic sphere of the personality of students – future coaches. The obtained results can be used for the psychological-pedagogical support of the preparation of future coaches and the improvement of the system of their professional education.

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Factors of forming safety competencies on water areas in student youth

UDC 797.2

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Abstract

Objective of the study is to identify the factors that reduce the risk of accidents based on students' mastery of swimming competencies.

Methods and structure of the study. The study was conducted using a cross-sectional design with a questionnaire that included questions related to socio-demographic data, organizational factors, and the level of swimming competencies. A survey was conducted of 125 students of a managerial university of all years of study: 57 (47.7%) female students and 68 (52.3%) male students.

Results and conclusions. Students' mastery of swimming skills before entering a higher educational institution ensures the effective formation of competencies related to safety on water bodies. By the end of their studies, senior students have a better command of competitive and applied swimming skills. The formation of skills in performing applied techniques and actions is a priority in the field of safety on water bodies.

Keywords: university students, swimming skills, applied actions, safety factors, injury-prone situations.

Introduction. Numerous studies show that uncontrolled presence at unequipped water bodies poses a real threat to the life and health of young people. Serious incidents on the water also occur in swimming pools. Safety factors must be studied in depth in order to prevent accidents on the water.

An analysis of modern literature leads to the conclusion that the existing methods for assessing the level of students' swimming preparedness are somewhat limited. A number of applied skills are not taken into account in the assessment, for example, the ability to cover long distances by swimming and the basic skills of survival in water [4]. As a rule, the level of swimming preparedness is assessed on the basis of mastery of the technique of competitive swimming styles [2]. The studies performed showed that the level of mastery of swimming skills can be influenced by gender, length of training, age, region, and availability of pools [1]. In addition, the ability to keep oneself afloat by means of

stroking movements reduces the number of accidents in water areas [5].

Nevertheless, a representative database is required for further study of this serious problem. The need to assess the factors of the formation of swimming skills is due to the correlation of the ability to swim with safety on the water and the reduction of accidents and drownings [3].

Objective of the study is to identify the factors that reduce the risk of accidents based on students' mastery of swimming competencies.

Methods and structure of the study. A survey was conducted of 125 students of a managerial university of all years of study: 57 (47.7%) female students and 68 (52.3%) male students. The age of the students who participated in the study was 19.7 ± 1.1 years.

The study was conducted using a cross-sectional design with a questionnaire that included questions



related to socio-demographic data, organizational factors, and the level of swimming competencies.

The socio-demographic data included age, gender, year of study, and the level of education of the parents.

The organizational factors were characterized by the age of starting swimming lessons, the total length of training, the duration of an individual training session (in minutes), and the number of pool sessions during a month.

The swimming competencies reflected the abilities in swimming the maximum distance using any style; swimming with a kickboard while working with the legs only; holding one's breath underwater; lying on the water; staying on the surface of the water with the help of supporting (sculling) strokes; and diving for distance. The maximum swimming distance was considered to be the distance that the subjects could swim independently without rest.

When studying injury-prone situations while in the water, the participants answered questions related to accidents or injuries received while in open water bodies. The answers were coded as follows: 1 – the subject was a participant in an incident on the water; 0 – there were no negative cases on the water in the subject's practice.

To assess the relationship between the level of mastery of swimming skills and the possibility of reducing injury-prone situations in the water, regression analysis was used with the construction of a logistic and hierarchical multiple model.

The beta-distribution coefficient (β) was used to model the probability of accidents under the influence of a certain factor. The confidence interval (CI) reflected the true value of the regression coefficient with a probability of 95%. To assess the differences between the groups, a two-way analysis of variance based on

the calculation of the Fisher F-criterion was used. The quality of the model was assessed on the basis of the coefficient of determination R^2 . The analysis was carried out using SPSS software version 24.0.

Results of the study and discussion. The results of the study indicate that male students can swim an average of 102.3 m, and female students – 76.5 m. It was revealed that the swimming distance increases with each year of study. More than 80% of the participants were able to perform the initial exercises for water familiarization (swimming with a kickboard, staying on the water, diving). About 35% of the students reported that they were unable to swim more than 5 meters using stroking movements. Even more students were unable to perform applied swimming techniques.

The results of the study make it possible to assess the current state of the swimming skills of higher-school students. Considering that the specialized literature mainly studies factors reflecting the causes of serious incidents on the water, the data of the conducted study establish a significant connection between mastery of swimming skills and safety on natural water bodies, which helps to expand the understanding of this issue and to contribute to the theory and methodology of the mass teaching of applied swimming skills to higher-school students.

The results of the conducted study indicate that more than 65% of the respondents are able to perform the proposed tasks, and 31.5% of them cannot swim a distance of more than 10 m.

The conducted study showed that male students have a higher level of swimming preparedness than female students.

The factors influencing the mastery of swimming skills are the location of the pool and the availability of swimming facilities (public, school, sports clubs),

Table 1. Parameters of the hierarchical linear models of multiple regression

Factors	β	CI	F	R^2
Age of starting swimming lessons	0.139	0.07:0.34	10.34	0.73
Gender	0.043	0.03:0.47	7.66	0.62
Level of parents' education	0.327	0.14:0.46	9.53	0.57
Length of swimming training	0.138	0.03:0.32	17.48	0.66
Frequency of sessions per week	0.126	0.03:0.32	14.32	0.83
Duration of a training session	0.255	0.17:0.47	22.84	0.71
Sessions in the pool	0.335	0.15:0.49	18.52	0.69
Sessions in an open water body	0.246	0.11:0.45	9.65	0.70
Skills of competitive swimming styles	0.543	0.15:0.62	18.97	0.52
Mastery of applied techniques in water	0.428	0.26:0.57	24.24	0.84



which positively correlated with the level of swimming preparedness.

Despite the fact that the duration of an individual session, the frequency of sessions per week, and the duration of training in swimming skills were significant factors influencing the level of students' swimming preparedness, they cannot fully ensure the neutralization of risks associated with the unpredictability of the physical conditions of the aquatic environment (temperature, currents, water transparency, depth and relief of the water body bottom, and the presence of underwater objects).

A significant factor influencing the effectiveness of teaching swimming skills was the age of starting lessons. Starting to learn swimming in high school is less effective than in primary school.

No differences were found in the risks of injury-prone cases while in the water between male and female students.

Each of the factors, including the duration of the initial training, the availability of lessons, the length of swimming training, and the level of mastery of swimming skills, was a significant precondition reducing the risk of accidents on the water. Most students visited bathing places in open water bodies or pools under the supervision of duty instructors and physical education teachers, which could have influenced the low level of risk of potentially dangerous cases.

Conclusions. Students' mastery of swimming skills before entering a higher educational institution ensures the effective formation of competencies related to safety on water bodies. By the end of their

studies, senior students have a better command of competitive and applied swimming skills. The formation of skills in performing applied techniques and actions is a priority in the field of safety on water bodies.

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Physical-culture and sports activity as an element of the socio-psychological re-adaptation of combat veterans

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Abstract

Objective of the study to identify the types of physical culture and sports activity in the socio-psychological readaptation of combat veterans.

Methods and structure of the study. The scientific work on the basis of the Plekhanov Russian University of Economics included the following stages: analysis of the scientific literature; questionnaire survey (n=279); interviewing of psychologists working with this target group (n=10).

Results and conclusions. The empirical data showed the existence of psychological problems of the ex-combatants (through body language) and the unwillingness of many to turn to specialists for psychological help from the position of "I am strong, I will cope on my own," as well as an active desire to take part in physical activity. Combat veterans (CV) perceive physical exercise and sports as a "normal" activity, but avoid formal psychotherapeutic programmes. The interpretation of the results points to the possibility of involving CV in the restoration of mental health through physical activity with the inclusion of special exercises for psychoregulation and the working-through of negative emotions by means of the techniques of body-oriented psychotherapy.

For the successful re-adaptation and creative resocialisation of veterans, an ecosystem approach is necessary in the interdisciplinary interaction of specialists (physical-culture and sports coaches, psychologists, doctors), the raising of their qualifications, and supervision.

Keywords: veterans, physical culture, sports, mental health, socio-psychology, analysis.

Introduction. Modern military conflicts under the conditions of extreme combat actions leave consequences both for the psychological state and for the physical state of combatants, which are prolonged upon the return from war and the transition to peaceful conditions of life [1, 3].

At present, various mechanisms of the re-adaptation and resocialisation of combat veterans (CV) into the peaceful community are being developed, from clinical-psychological help to ex-combatants to the formation of adequate social expectations in the Russian community in relation to this target group. Specialists point to the necessity of an interdisciplinary approach (the synthesis of medicine, psychology, and physical culture) to the questions of the socio-psychological re-adaptation of CV, and to the search for new approaches, including types of activity ensuring

their successful and creative resocialisation [2, 6].

Objective of the study to identify the types of physical culture and sports activity in the socio-psychological readaptation of combat veterans.

Methods and structure of the study. The study on the basis of the Plekhanov Russian University of Economics included the following stages: analysis of the scientific-methodological literature; questionnaire survey of combat veterans (n=279); interviewing of psychologists working with this target group (n=10); formulation of conclusions.

Results of the study and discussion. Socio-psychological re-adaptation acts as a process of restoring the ex-combatant's ability to successfully adapt in society through the return of the veteran's psyche to a state of "normal adaptedness" to the conditions of peacetime [3].



Under the conditions of military actions, a restructuring of the nervous system, the psyche, and behaviour occurs in combatants; combat reflexes are formed (special muscle groups are trained) according to the “fight, flight, freeze” scheme; and under the conditions of combat stress factors prolonged in time and intensity, a breakdown of the adaptation mechanisms may occur, including at the psychological level (anxiety, excitability, aggression) [1, 2].

At the biopsychic level, there are two types of reaction to combat stress: the inhibitory type is characterised by general muscular tension (stiffness of posture and movements) and the slowed course of mental processes; the excitable type is manifested in extraversion, the hypertrophy of motor manifestations, and the rapid change of decisions taken [6].

The interdisciplinary approach to the system of the psychoregulation of veterans through the synthesis of scientific knowledge in medicine, psychology, and physical culture actualises the use of physical exercises on the basis of body-oriented psychotherapy (BOP) for the working-through of the suppressed emotional states experienced in combat life [5]. BOP, based on the two-way connection between the brain and the body (through the body one can influence the brain and emotions), includes a group of psychotherapeutic methods, is oriented towards the study of the body (psychological needs and problems are manifested in the body) and the teaching of ways of resolving psychological problems through special exercises. Among the main methods of BOP, effective both in the recovery after psychological traumas and for personal growth, is distinguished the method of W. Reich, including techniques (exercises) for the working-through of mental defences (psychological clamps) that form muscular clamps (muscular armour) [7].

For veterans, the development of programmes is necessary with the inclusion of special physical exercises for the correction of the mental state after combat psychotraumas, the strengthening of health, and the preservation of the skills of military physical training: modern fitness technologies and elements of traditional Eastern practices (yoga, wushu, capoeira, etc.) [5].

In the conducted interviewing, 87% of the psychologists emphasised that, when working with veterans, they regularly encounter the dominance of the bodily manifestations of trauma over verbalised experiences: “ex-combatants cannot say what is happening to them, but their body (stiffness in the shoulders, shal-

low breathing, flinching at loud sounds) speaks the language of trauma, which we are learning to listen to”.

The specialists indicated the positive dynamics of the socio-psychological re-adaptation of CV who regularly engage in physical activity. Veterans perceive physical exercise and sports as a “normal” activity, but avoid formal psychotherapeutic programmes. At the same time, one and the same sport may have an opposite effect in veterans depending on the character of the trauma: for one group, boxing helped to “release aggression in a safe way,” while in another it provoked anger and aggression after training. The choice of the type of activity is determined not by physical capabilities, but by the character of the traumatic experience (veterans with a trauma connected with enclosed spaces avoid training in closed halls).

According to the results of the questionnaire survey of combat veterans (116 people aged 35+, 82 respondents – 45+, 28 – 55+, 46 – 25+, 7 – under 25), it was recorded that 191 (69%) of the veterans did not turn for psychological help for various reasons (Figure 1). Among the other reasons for the ex-combatants’ refusal, distrust and financial problems were indicated, which confirms the statements of the psychologists about the unwillingness of CV to participate in psychotherapeutic programmes.

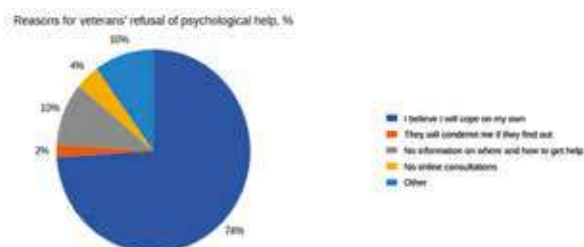


Figure. 1. Reasons for combat veterans’ refusal of psychological help

In identifying the priorities in physical-culture and sports pursuits, a high activity of the veterans in the choice of activities was noted (Figure 2).

Among the other motor activity, they indicated sports (alpine skiing; equestrian; shooting; mountain, hiking, and auto tourism) and types of physical activity (rock climbing, hunting, fishing), on the one hand – activity close to them in military life, and on the other – types of activity aimed at the reunification of the emotional state with nature.

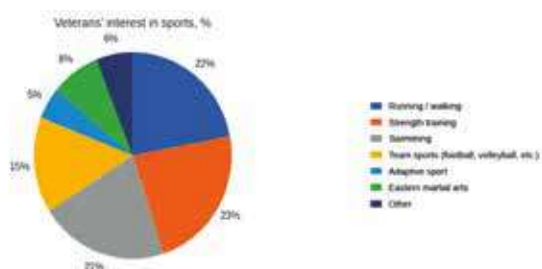


Figure 2. Priority types of physical activity for combat veterans

The results of the surveys showed the existence of psychological problems of the ex-combatants (through body language) and the unwillingness to turn to specialists for psychological help from the position of “I am strong, I will cope on my own,” as well as an active desire to take part in types of sports activity, offering individual requests in physical-culture and leisure activity.

These results point to the possibility of involving veterans in the restoration of mental health through physical activity with the necessary inclusion of special physical exercises for psychoregulation by the method of W. Reich (elements of breathing gymnastics, fitness, Eastern practices), and the possibility of working through negative emotions by means of meditative techniques and techniques of working with the “muscular armour.”

However, while noting the interdisciplinary interaction of specialists as an important component of the socio-psychological re-adaptation of CV, 73% of the psychologists pointed to the absence of systemic cooperation between specialists: “I recommend that the veteran take up swimming, but I do not know how the coach works with his fear of water, and the coach does not inform me that during training the client experiences panic attacks.”

We support the scientific position of I.V. Manzheley on the necessity of consolidating the efforts of specialists in interdisciplinary and interdepartmental interaction relying on the ecosystem approach for the effective socio-psychological re-adaptation and creative resocialisation of combat veterans [4].

Conclusions. Thus, for the development and implementation of physical-culture and sports programmes using the techniques of body-oriented psychotherapy, new standards of the training of specialists working with veterans are necessary.

Effective in this context is also the creation of interdisciplinary teams (psychologist + coach + doctor) that not only accompany the veteran at all stages of re-ad-

aptation, but also develop standardised programmes of physical activity taking into account the type of the trainees’ reaction to combat stress, physical limitations, and the stage of re-adaptation, and are also interested in joint additional education in this sphere.

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Analysis of the readiness of schoolchildren who participated in the regional stage of the All-Russian Olympiad in Physical Education

UDC 796/799



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Abstract

Objective of the study is to analyse the outcomes of the theoretical-methodological test at the regional stage of the All-Russian Olympiad of schoolchildren of the Tyumen Region for the period from 2021 to 2025.

Methods and structure of the study. In the period from 2021 to 2025, 1012 schoolchildren (9-11 grades) took part in the regional stage, of whom 48.7% (493) were female and 51.2% (519) were male.

Results and conclusions. The average score in the theoretical-methodological test during this period did not rise above 6.9 points among the girls and 6.7 among the boys out of 20 possible. It was noted that the participants most successfully cope with closed-type questions and matching tasks. And the greatest difficulty for the participants, as a rule, is caused by open-type questions, tasks requiring knowledge of terminology in the description of physical exercises, as well as problem-solving tasks. The preparation of schoolchildren for participation in the All-Russian Olympiad should be regular, clearly thought out, and include the consideration of such topics as: the cultural-historical foundations of physical culture and sports, the foundations of the theory and methodology of teaching motor actions, the development of physical qualities, the rules of competitions in various sports, the conceptual apparatus in the field of physical culture and sports.

Keywords: *physical culture and sports, preparedness, schoolchildren, Tyumen Region, All-Russian Physical Culture Olympiad.*

Introduction. Olympiads are an important instrument of the education system and a mechanism for finding and supporting talented youth [2, 5]. The regulations for holding the Olympiads provide the opportunity to participate for all schoolchildren, including those with special health conditions and disabilities. For the winners and prize-winners of the Olympiads, various forms of encouragement and support are provided, including the possibility of admission to higher educational institutions without examinations in the corresponding profile, as well as a monetary reward.

The Physical Culture Olympiad takes its beginning in the years 1999–2000 and has functioned regularly ever since. Despite the specificity of the discipline

“Physical Culture,” the content of the tasks takes into account the main message of the Olympiad movement – the formation of a stable interest in the academic discipline and the development of creative and research abilities in the field of physical culture and sports. With the general orientation of the Physical Culture Olympiad, there are also fundamental differences from other subjects. The Olympiad tests include two sections: practical and theoretical-methodological. The practical section presupposes tests in the sports that are part of the basic portion of the school sample program in physical culture in the sections: gymnastics, sports games (basketball, volleyball, football, floorball, handball), athletics, applied physical culture. A sport from the variable (regional)



part of the school program may also be included. The Central Subject-Methodological Commission recommends including from two to four tasks in the practical test of the Olympiad.

The theoretical-methodological test takes place in the form of testing and may include the most diverse range of question topics, from the cultural-historical foundations of physical culture and sports and the Olympic movement to the psychological-pedagogical characteristics of physical culture and sports activity and anti-doping rules. Thus, the participant of the Physical Culture Olympiad is presented not only with high requirements for physical and technical preparedness in various sports, but also with the need for a high level of erudition in the field of physical culture and sports. It is precisely low scores in the theoretical-methodological test that may prevent students from advancing to the final stage of the Olympiad. Therefore, the analysis of the performance of the theoretical-methodological test by schoolchildren at the regional stage of the All-Russian Olympiad and the identification of problem areas in their preparedness is relevant and will make it possible to determine further directions for building effective work with athletically gifted students.

Objective of the study is to analyse the outcomes of the theoretical-methodological test at the regional stage of the All-Russian Olympiad of schoolchildren of the Tyumen Region for the period from 2021 to 2025.

Methods and structure of the study. The study was conducted on the basis of the Institute of Physical Culture of Tyumen State University. The regional stage of the Olympiad is traditionally held on the basis of the sports facilities and the auditorium fund of the institute, with the involvement of the teachers of the Department of Technologies of Physical Culture and Sports Activity as a jury.

The article presents and analyzes the data of the theoretical-methodological test of the schoolchildren of the Tyumen Region participating in the regional stage of the All-Russian Olympiad for the period from 2021 to 2025.

Results of the study and discussion. Figure 1 presents the dynamics of the quantitative composition of the participants of the regional stage of the Tyumen Region. Thus, it can be noted that over the five years from the 2020 to the 2025 academic years, 1012 schoolchildren of grades 9–11 took part, of whom 48.7% (493) were female and 51.2% (519) were male.

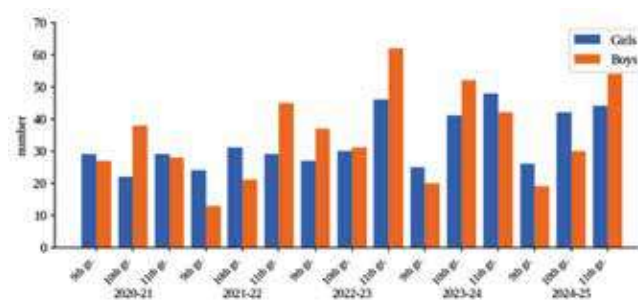
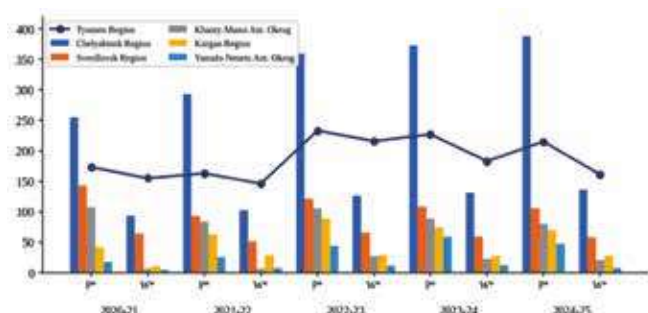


Figure 1. Quantitative composition of the participants of the regional stage in the Tyumen Region for the 2020–2025 academic years

The distribution of participants by grade varies. Thus, the largest number of grade-9 students was recorded in the 2022–23 academic year – 64 people, and the smallest – 37 students in the 2021–22 academic year. The largest number of grade-10 students was observed in the 2022–23 academic year – 93 people, the smallest in the 2021–22 academic year – 52 people. In the 2022–23 academic year, 108 people studying in grade 11 took part in the regional stage, which is 51 people more than in the 2020–21 academic year. Analysing the quantitative dynamics, we note that after the 2022 academic year the number of participants increased by 6.9%, and this trend continued further. Perhaps such changes are connected not only with the attractiveness of the academic subject “Physical Culture” among schoolchildren, but also with the solution of the tasks of attracting the population to regular physical culture activities, which are successfully solved in the Tyumen Region.

The increased interest of not only grade-11 students, but also of younger grades, is due to the introduction of additional privileges that make it possible, within 4 years, to enter a higher educational institution in the corresponding profile after becoming a winner/prize-winner of the final stage of the Olympiad.

The quantitative-qualitative indicators of the participation of schoolchildren by the constituent entities of the Ural Federal District are presented in Figure 2. Thus, of the six constituent entities of the Ural Federal District, the Tyumen Region, in terms of the number of participants, is ahead of such regions as the Sverdlovsk Region and the Khanty-Mansi Okrug and occupies second place, yielding only to the Chelyabinsk Region.



P* – participants; W* – winners and prize-winners.

Figure 2. Comparative dynamics of schoolchildren's participation in the regional stage of the All-Russian Olympiad in the Ural Federal District

It is important to note that the number of winners and prize-winners of the regional stage in the Tyumen Region is significantly larger in comparison with other constituent entities. Thus, for example, in the Chelyabinsk Region only 35% of the participants become winners and prize-winners of the regional stage, whereas in the Tyumen Region it is more than 70%. Despite this fact, the schoolchildren of the Tyumen Region lack the points to advance to the final stage. This testifies to the fact that, perhaps, the system of determining winners and prize-winners requires revision in the region.

The theoretical-methodological test at the regional stage takes place in the form of testing, for which the participant is allotted 45 minutes. The table 1 presents the types of tasks and their quantity for the period of the 2020–2025 academic years.

Thus, it can be noted that the number of tasks at the regional stage over the five years varied from 19 to 25 questions, combined by the type of task into 5–7 groups.

Every year, the largest number of questions in the test was offered in closed form, from 2 to 9 tasks – in open form, from 1 to 4 matching tasks. The last three academic years included one or two problems, less often – crosswords, rebuses, tasks with choosing the correct sequence. In the 2024–25 academic year, three tasks with illustrations in open form and two on describing physical exercises were presented.

The jury noted that the participants most successfully cope with closed-type questions and matching tasks. And the greatest difficulty for the participants, as a rule, is caused by open-type questions, tasks requiring knowledge of terminology in the description of physical exercises, as well as problem-solving tasks. For example, analyzing the results of the theoretical-methodological test in the 2024–25 academic year, it can be noted that in the eighth question, where it was necessary to insert the missing words into the saying of the ancient Greeks about an uncultured person: “Can neither (1), nor (2)!” only three participants coped with the task. In the question where it was necessary to name the deviation from the model of technique when performing an exercise that has a noticeable negative impact on the result of the action, only 12.8% of the students coped. In the tenth question, only three ninth-graders and one eleventh-grader were able to indicate how an athlete's ability to maintain a given speed or pace of movements for a long time is designated.

Table 1. Types of tasks and their quantity at the regional stage for the period 2020–2025

Types of tasks	Academic year				
	2020-21	2021-22	2022-23	2023-24	2024-25
Closed-form task	9	6	10	10	7
Open-form task	4	9	4	6	7
Task with choosing the correct sequence	0	3	0	0	0
Matching task	4	3	2	1	2
Rebus task	1	0	0	0	0
Task on choosing correct positions	1	1	1	0	0
Crossword task	1	0	0	1	0
Problem-solving task	0	0	2	1	2
Task with illustrations in open form	0	0	0	0	3
Task involving enumeration	0	2	0	1	0
Task on describing physical exercises	0	1	0	0	2



More than 85% of the participants were unable to answer the question of how the actions of trainees after the teacher's command for adopting a particular formation are designated. More than 92% of the participants were unable to give the correct answer to the question of what a player or team occupying the last place in a championship is called. Almost 95% do not know what, in chess, a gross error by a player that leads to checkmate, material loss, or a worsening of the position is called. Only 25.3% of the participants correctly indicated that the movement of a column begins on the executive command "March!". It should be noted that grade-9 students coped better with the illustrated tasks than grade-10 and grade-11 students. Thus, the average group indicator of the correct performance of three tasks of this type was 40.2% among grade-9 students, whereas among grade-10 students it was only 27.8%, and in grade 11 – 35.3%. The tasks where the description of physical exercises was required caused difficulty for all the participants of the regional stage. Serious difficulties also arose in solving the problems. In the problem on calculating the results in shooting, all the ninth-graders, 98.6% of the tenth-graders, and 97% of the eleventh-graders were unable to perform the calculations correctly and give a complete answer to the question of the problem. In the second problem, only 14% of the participants were able to correctly distribute the teams in the tournament table of a basketball competition.

These results testify to the fact that, in preparing for the theoretical-methodological test, more attention should be paid to such topics as: the cultural-historical foundations of physical culture and sports, the foundations of the theory and methodology of teaching motor actions, the development of physical qualities. It is necessary to know the rules of competitions in various sports, to be able to describe a motor action terminologically correctly, etc.

Figure 3 presents the dynamics of the indicators of the theoretical-methodological preparedness of students for the 2020–2025 academic years. It should be noted that among grade-11 girls a decrease in the average score was observed. Thus, in the 2021 academic year the average score was 6.9 points, and in 2025 it decreased by 3.2 points. A negative dynamics is also observed among grade-11 boys. The highest average score was recorded in 2023 – 6.7, and in the last two years it was 4.3 points.

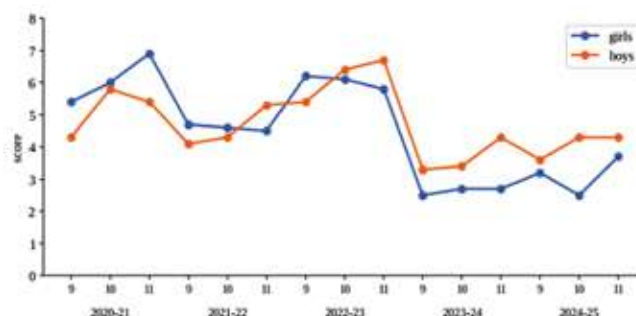


Figure 3. Dynamics of the theoretical-methodological preparedness of schoolchildren by average score

Comparing the results of the girls and the boys, it can be noted that in the 2020–21 academic year the girls coped better with the theoretical-methodological test. In the 2021–22 academic year, among the girls of grades 9 and 10, the average score was higher than among the boys. Among grade-11 students, the indicator of the boys is 0.8 points higher. In the 2022–23 academic year, the indicators of the girls and the boys were higher than in the previous years. Comparing the results by average score, it can be noted that grade-9 girls coped with the task better than grade-9 boys and grade-10 girls, and the average score of grade-11 boys is 0.9 points higher than that of the girls. The average score of the boys in the 2023–24 academic year is higher than that of the girls, but on the whole a sharp decrease in scores is observed for both. In the 2024–25 academic year, the indicators of the boys are slightly higher than those of the girls.

It should be noted that the maximum possible "credited" score that a participant can receive in the theoretical-methodological test is 20 points. Thus, the results of the students of the Tyumen Region testify to the insufficiently high theoretical-methodological preparedness of both boys and girls. In this connection, difficulties arise for selection to the next, final stage of the Olympiad.

Determining the level of theoretical-methodological preparedness of the schoolchildren, it can be noted that since the 2022–23 academic year a sharp decrease in it has been observed. Thus, 215 participants coped with less than 50% of the tasks. And in the 2024–25 academic year there are no schoolchildren who were able to cope with more than 50% of the tasks. Unfortunately, such results do not allow the participants to score the necessary number of points to advance to the All-Russian stage.



Conclusions. Thus, these indicators testify to the insufficient level of theoretical knowledge and methodological skills in the field of physical culture and sports among schoolchildren. We believe that the preparation of schoolchildren for participation in the All-Russian Olympiad should be regular, clearly thought out, and include a wide range of topics. To improve the current situation, school physical culture teachers should perhaps carry out the early selection of schoolchildren who show interest and abilities in physical culture and sports activity. In lessons, attention should be paid not only to the performance of practical tasks by schoolchildren, but also to acquainting them with the theoretical aspects of physical culture and sports activity. University teachers should offer professional development courses for teachers aimed at working with talented and athletically gifted schoolchildren. The training camps regularly held before the regional stage should be of a more long-term nature, with the possibility of considering relevant topics and including diverse forms of teaching: group, game-based, interactive, etc. For more interested schoolchildren, cooperation with senior students of the institute of physical culture as mentors should be offered.

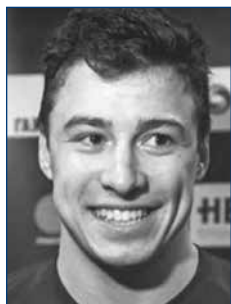
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Positive functions of socialisation and the development of social relations in ice hockey

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Abstract

Objective of the study is to characterise the prerequisites for the realisation of the positive functions of socialisation and the development of social relations in ice hockey.

Methods and structure of the study. Analysis of the literature, pedagogical observation, questionnaire survey, testing, correlation and factor analysis, interpretation. The series of studies were conducted on a contingent of hockey players from 2022 to 2025 at the following stages: initial preparation and training – National Hockey Center, Moscow; the stage of higher sports mastery – Saint Petersburg.

Results and conclusions. The following were revealed: the factor weights of the qualities and abilities relevant in hockey – the criteria of the intellectual and motor adequacy to the social situation of development within the contours of the conjugated interaction of scientific approaches; the resources of the mutual complementation of effective game actions by hockey players under conditions of cooperation with partners and competitive counteraction to the opponent; the characteristic features of the socio-cultural influence of ice hockey on the social development of the personality.

Keywords: *sports improvement, ice hockey, socialisation, real functions, effective cooperation, criteria and conditions of development.*

Introduction. The conjugation of the components of sports preparation in the training process of young and qualified hockey players is conditioned not merely by the formalisation of the general ideas – the effective, economical, proportionate development of the athlete's potential, his functional, physical, technical, tactical, and theoretical preparedness – but, above all, by the determination of the system-forming principles of the actualisation of the potential of the developing hockey player under the conditions of his socialisation. Here, “the substantiation of the regularities of the dynamics of the development of the systems ‘athlete’ and ‘team’ is the basis for the forecast and planning of the training process” [4, p. 425], whereas “the linear application of scientific approaches does not make it possible

to reveal the ways... of teaching and upbringing in sports, requiring the assessment of the integrative influence of the components of sports preparation” [1, p. 730] on the socialisation of the growing personality in sports activity.

Objective of the study is to characterise the prerequisites for the realisation of the positive functions of socialisation and the development of social relations in ice hockey.

Methods and structure of the study. Analysis of the scientific-methodological literature, pedagogical observation, questionnaire survey, testing, correlation and factor analysis, interpretation. The series of studies were conducted on a contingent of hockey players from 2022 to 2025 at the following stages: initial preparation (n=30), training (n=30) –



National Hockey Center, Moscow; the stage of higher sports mastery (n=21) – Saint Petersburg.

Results of the study and discussion. Pedagogical observations and experimental studies in the field of constructing the dialectical methodology of functional analysis in the scientific study of ice hockey, conducted earlier [2, 3] and covered by us in the 2026 publications, make it possible to determine the features of the realisation in modern society of the positive functions inherent in ice hockey in the process of socialisation in the system of social relations.

1) Over the long time of the development of ice hockey, through the efforts of scientists, coaches, and athletes, a pedagogical technology has been formed that purposefully develops physical qualities and abilities, motor skills, and the components of tactical, theoretical, and psychological preparedness and of the orientation of the personality: interests, needs, value orientations of bodily culture – having great significance for raising the level of sports mastery.

The social approach in structural interrelation with the system and other scientific approaches makes it possible to reveal the socially significant manifestations of the personality in training-competitive activity – the simultaneous cooperation with partners and counteraction to the opponent, where social interaction is conditioned by the influence of factors actualising or minimising the effects of a technical-tactical combination with a certain partner, taking into account the (preceding) effectiveness of team interactions (Table 1).

The high factor weights of the abilities relevant in hockey (the criteria of the intellectual and motor adequacy to the situation) act as a resource of social interaction in the groups of initial preparation (IP) and training (TTG). The character of cooperation with partners is conditioned by the prerequisites of functional readiness for joint activity in the system of individual-maximal requirements for the parameters of their realisation.

The figure 1 depicts the probabilistic areas of the mutual complementation and compensation of

System approach to constructing the control of the process and results of the sports preparation and preparedness of young hockey players																																					
Qualities and abilities relevant in hockey and their integrative formations					Criteria of intellectual and motor adequacy to the situation																																
Social approach	Cognitive approach	Manifestation of the athlete's intelligence: in the system of social relations	social: interpersonal, intrapersonal intelligence (I)	emotional I	verbal I	socio-environmental influence of non-intellectual manifestations	theoretical I	practical I	informational I	technological I	motor I	motivational I, in the structure of the intrapersonal	cognitive abilities (their functional and operational components)	differentiation-integration paradigm of intelligence development	mental experience	cognitive processes / functions	Intellectual abilities in conjunction with psychomotor, regulative, organisational abilities (A) and cognitive styles	spiritual-moral qualities	volitional A	regulative A	psychomotor A	motor-coordination A	physical qualities	functional A	indicators of physical development	Sensation	Perception	Attention	Thinking	Memory	Representation	Imagination	Integrative approach	SPEED OF PERCEPTION (as a prerequisite for action),			
																																		of one object, factor weight (FW): IP – 0.712; TTT 0.730		of a number of important objects, FW: IP – 0.785; TTT – 0.810	
																																		of the spatio-temporal and dynamic characteristics of activity during confrontation with the opponent(s), FW: 0.748; 0.783			
																																		CONCENTRATION OF ATTENTION			
																																		in a game moment, FW: 0.746; 0.759		in game activity (interference-resistant behaviour), FW: 0.712; 0.752	
																																		permanent concentration on the game, fixation of threats, instantaneous determination of possibilities, FW: 0.784; 0.795			
																																		EFFICIENCY OF THINKING			
																																		of the receptive:		of the rational:	
																																		“No time to think” – intuitive, receptive thinking, FW: 0.734; 0.758		“There is time to think” – rational interpretation of the conditions of activity, FW: 0.711; 0.726	
																																		ensuring situational dominance over the opponent when solving an intellectual task, FW: 0.759; 0.814			
TACTICAL FLEXIBILITY OF THINKING																																					
ensuring the re(sub-)structuring of technical-tactical schemes to fit the situation, FW: 0.738; 0.795																																					
Acmeological and personal-activity approaches																																					

Table 1. Factor weights of the qualities and abilities relevant in hockey – the criteria of the intellectual and motor adequacy of the athlete to the social situation of development within the contours of the conjugated interaction of scientific approaches



the situationally relevant (in competitive activity) functional, physical, motor-coordination, technical-tactical, and mental abilities of qualified hockey players of the game five, where the following are characterised: 1 – morphometric indicator: Quetelet index; 2 – maximum anaerobic power; 3 – power

of work at VO_{2max} ; 4 – power of work at VO_{2max} relative to body weight; 5 – power of work at the anaerobic threshold; 6 – speed-strength abilities (explosive strength); 7 – absolute strength; 8 – relative strength; 9 – speed abilities (A) and speed endurance (the tempo of movements against the back-

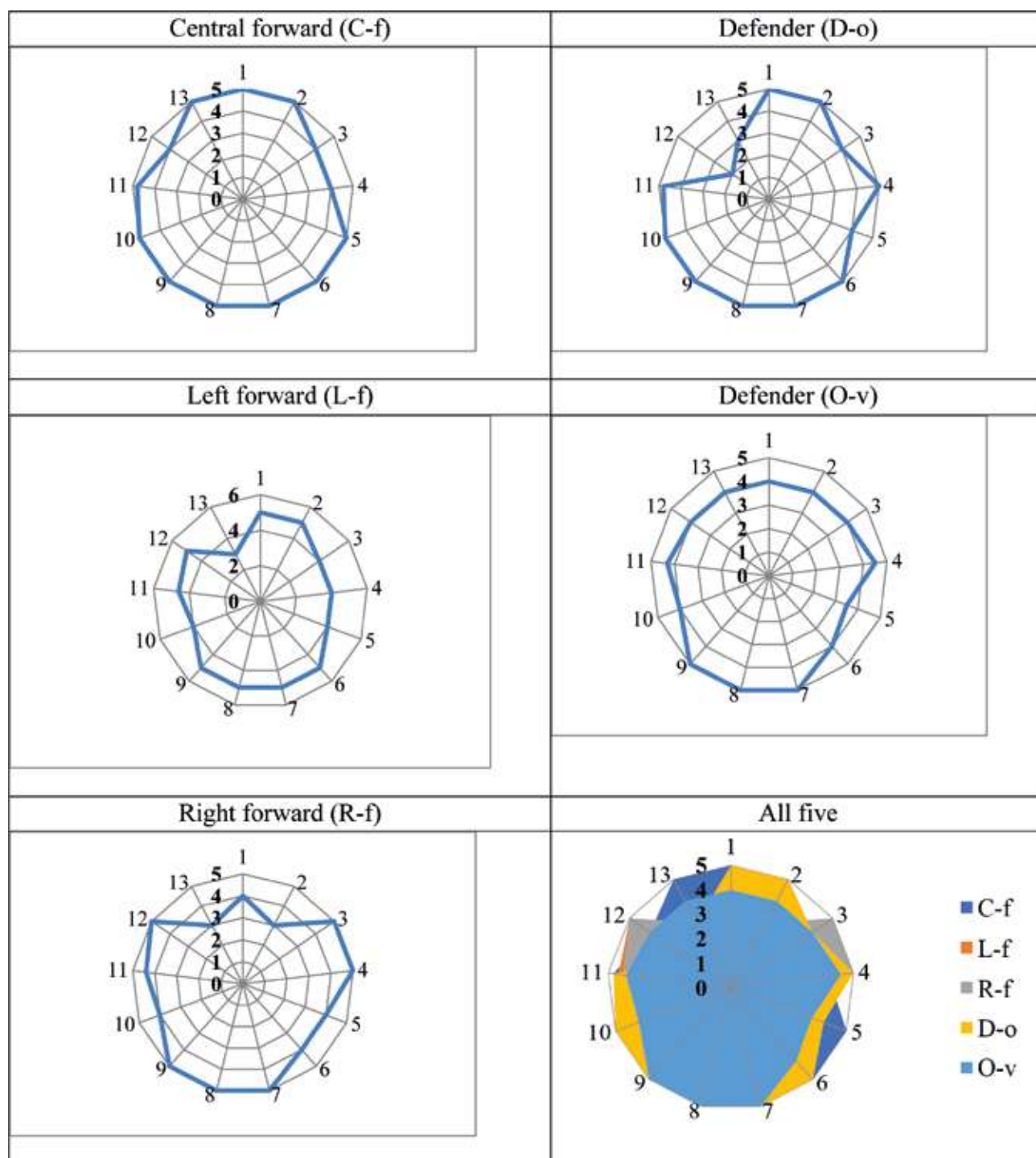


Figure 1. Resources of the mutual complementation of effective game actions by qualified hockey players in cooperation with partners and competitive counteraction to the opponent



ground of increasing fatigue); 10 – coordination A at the maximum tempo of the realisation of technical actions; 11 – average total indicator of functional, conditioning, and coordination A; 12 – effectiveness of intellectual decisions in attacking play when realising functional, conditioning, and coordination A; 13 – effectiveness of intellectual decisions in defensive play when realising functional, conditioning, and coordination A. The first weighty factor, including that of social activity – the combinatorial realisation of A – is absolute strength (0.810) and coordination A at the maximum tempo of the execution of technical actions (0.787).

Functional A characterise the second factor: power of work at VO₂max (0.890), power of work relative to body weight (0.704), power of work at the anaerobic threshold (0.761). The third factor unites the indicators of “maximum anaerobic power” and “explosive strength of the leg muscles” (0.852; 0.864), which speaks of the weight of the anaerobic mode of functioning and actualises the vector of training activity “under conditions of advancing fatigue.” The fourth factor is “play in attack” (0.863), where “points per season” are connected with “total time on the ice” (0.74) and reflect (Correlations, $p < 0.5000$, $N = 21$) the weight of the factor of teamwork and social communication in training-competitive activity.

2) Sports training and sports competitions in ice hockey place high demands on the athlete’s manifestation of volitional qualities and self-regulation: to achieve success, the hockey player is required to make constant efforts, restrictions, and the observance of a strict regimen over many years, and, moreover, until the very last minute there is no guarantee of full success. This contributes to the formation and improvement of mental qualities and abilities (will, attention, discipline, operational thinking, creative abilities) – his mental culture. Thereby ice hockey acts as a “school of will,” a “school of emotions,” a “school of character”; the sport makes it possible to satisfy a person’s need for self-realisation and self-affirmation. Super-complex competitive situations require the taking of creative decisions, which contributes to the development of creative abilities in the social environment.

3) The important socio-cultural significance of ice hockey – especially for children and adolescents – consists in the fact that sports training and sports competitions introduce them to socially significant

roles and models of behaviour, form important cognitive skills (the observance of rules, the consideration of the consequences of their (non-)fulfilment), which is of great importance in the process of the socialisation of the growing person and in the system of social relations.

4) Ice hockey is characterised by emotionality, free self-disclosure, positive emotions, the communication of the participants of the activity, and the simplicity and sameness for all athletes of the requirements and rules, which contributes to the communication of athletes regardless of their race, skin colour, religion, or ideological views. Thereby ice hockey makes an important contribution to introducing a person to the values of the culture of peace and the culture of social relations as a whole.

5) Modern ice hockey demonstrates a high level of mastery of hockey players, an important element of which is the ability to act “according to the laws of beauty” when performing various technical-tactical actions and techniques, which testifies to the realisation of aesthetic potential. The real aesthetic functions of ice hockey should also include the beauty of the ceremonies of the opening of competitions and the awarding of athletes, and the aesthetics of public performances.

6) Performing in various sports competitions, hockey players defend the interests of their team, and at international competitions – of their country. This, undoubtedly, cultivates in athletes a culture of cooperation, civic consciousness, patriotism, and love for the Motherland.

7) Many people, in their free time, for the purposes of active rest, entertainment, and communication, directly participate in sports competitions in ice hockey or watch these competitions. This testifies to the important significance of this sport in the sphere of leisure.

8) In modern society, under the conditions of a market economy, ice hockey as a certain variety of elite sport, by virtue of its popularity, occupies an important place in the structure of show business, and therefore many people make engaging in this sport their professional activity, a means of satisfying their material needs.

Conclusions. Thus, in modern society many important possibilities of ice hockey for the fulfilment of positive functions are practically realised, the basic foundations of which are socialisation and the development of social relations by means of ice



hockey – the intellectual and motor adequacy to the requirements of team interaction in the game.

The non-standardised character of competitive activity and the multiplicity of the manifestations of its success, revealed by us in the illustrative material, condition the determination of the spectrum of supporting qualities, abilities, and possibilities of the personality for the fulfilment of important positive functions of socialisation in the system of social relations, and above all this concerns the formation of the values of spiritual-moral culture, ensuring the constructiveness of interaction with partners in game combinations and the regulated counteraction to the opponent.

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Technology for modelling a sociological study of social conflicts in the sphere of sports

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Abstract

Objective of the study is the development of a technology for modelling a sociological study of social conflicts in the sphere of sports, providing for certain variants of their prevention and resolution.

Methods and structure of the study. This work represents a descriptive sociological study, built and organised on the basis of the consistent use of the sociological methods of document analysis and participant observation, and the general-scientific operations of typologisation and modelling.

Results and conclusions. The results of the conducted study prove the possibility of constructing a relatively universal model of a sociological study of social conflicts in the sphere of sports. The indicated model includes the logic of constructing a typical structural-content map and a typical scientific thesaurus filling the sociological toolkit. However, the profile-applied application of this technology for modelling a thematic sociological study is necessarily connected with the knowledge of various levels and fragments of management and organisation in the sphere of sports, sports activity, sports management, and sports education, without which the indicated sociological model is deprived of a practical foundation and turns into a pure abstraction. Accordingly, each particular profile-applied model of the technology of a sociological study of a social crisis in the sphere of sports will necessarily require the development of a particular thesaurus as well, adapting the sociological toolkit to the specifics of the level and fragment of socio-crisis counteraction under consideration.

Keywords: *social conflicts in the sphere of sports, sociological study, modelling technology, prevention and resolution of social conflicts in the sphere of sports.*

Introduction. Conflict as a social phenomenon has long and fruitfully been researched and studied in many sciences, in particular, in conflictology, sociology, and psychology [1-8, 10, 11, 13, 15, 17-22]. Profile-applied science is not an exception in this context either: pedagogy, the theory and methodology of sports, sports management, sports psychology, and the sociology of sports. Although in the field of profile-applied science there are far fewer such thematic publications, and they concern, in the main, the procedure of sports arbitration, other legal procedures, and the legal status of athletes [1-3, 11, 12, 16]. Meanwhile, social conflict in the sphere of sports can and must be studied at various levels, in various sports, and, moreover, both in a particular and in a general form [9, 12, 16].

As a result of such a diverse and multidirectional study, a confrontation of various approaches and points of view cannot but arise and, accordingly, of-

ten arises, caused by numerous interdisciplinary and intradisciplinary conceptual contradictions. In this article, the authors make an attempt at metascientific sociological modelling, partly "removing" the above-mentioned problem of theoretical-methodological and methodical uncertainty. The choice of precisely the sociological direction of the study of social conflict in the sphere of sports is conditioned by the universality of the application of the sociological methodology and technology in practically all the scientific disciplines of the social block.

The scientific problem is the phenomenon, caused by the multiplicity and various scientific-disciplinary affiliation, of the polysemy and partial contradictoriness of the approaches to the interpretation of the theme of social conflicts, which hinders the formation of an unambiguous scientific understanding of the essence and the possibilities of the typical resolution of social conflicts in the sphere of sports.



The relevance of the study is the necessity of “removing” the polysemy and partial contradictoriness of the approaches to the interpretation of the theme of conflicts in the sphere of sports through the development of a typology of such profile-applied conflicts and the construction of a scientifically substantiated theoretical-technological model presupposing the possibility of their prevention or resolution.

Objective of the study is the development of a technology for modelling a sociological study of social conflicts in the sphere of sports, providing for certain variants of their prevention and resolution.

Methods and structure of the study. This work represents a descriptive sociological study, built and organised on the basis of the consistent use of the sociological methods of document analysis and participant observation, and the general-scientific operations of typologisation and modelling.

Results of the study and discussion. The summary result of the conducted descriptive study by the method of the sociological analysis of documents was an analytical reference, including the following main provisions:

1) A specific sociological study of social conflict can be conducted using any of the four main scientific-empirical methods of collecting primary sociological information: the analysis of documents, the survey, observation, the experiment. At the same time, each of the chosen methods of the specific sociological study is characterised by its own features, manifested, in particular, in the formal and structural-content organisation of the toolkit (the document analysis form, the questionnaire or interview form, the observation sheet, the experiment journal).

2) Despite the features of the different types of specific sociological study of social conflict, there exists a certain common structural-content core characteristic of each of them. Acting as such is the structural-content map, which, following the prominent American representative of post-positivism Thomas Samuel Kuhn (1922–1996), could be called an interdisciplinary scientific matrix or scientific paradigm, and, in accordance with the approach of another representative of the school of the philosophy of science, the English philosopher of Hungarian origin Imre Lakatos (1922–1974), could be designated as a scientific research programme.

3) The logic of constructing the structural-content map of the sociological study of social conflict contains a number of consistently carried-out theoretical-empirical steps-procedures:

– carrying out the analytical procedure of the identification (the statement of the presence of characteristic features) of social conflict, that is, the procedure of the formal fixation of the social conflict situation, defining as such the acute phase of the development of an individual, group, or mixed social contradiction, threatening the conflicting parties with physical, mental, or social damage;

– the determination and characterisation (the construction of a socio-psychological portrait) of the conflicting parties;

– the determination of the spatio-temporal framework of the current stage and period (phase) of the development of the social conflict, proceeding from the premise of the presence of three main stages of the development of a social conflict (the pre-conflict or preconflict, the actual or directly conflict, the post-conflict), given that each of the stages has its own periods or phases;

– the determination of the social context (the control social contingent included in the conflict, and the neutral social environment not directly included in the conflict);

– the determination of the real role (the orientation and degree of influence) of the various elements of the social context;

– the compilation of a scientific forecast of the course of the development and the consequences of the social conflict both for the conflicting parties and for the social context (the near and far environment);

– the working out of the strategy and tactics (the sequence of the application of methods and means) of the resolution of the social conflict;

– the assessment of the possible prospects and the desirable line of the unfolding of the post-conflict stage, the development and approval by the parties of the conflict of preventive measures, as well as sanction measures in the case of a departure from this line.

4) Naturally, in addition to the construction of the structural-content map of the sociological study of social conflict, for the creation of a full-fledged toolkit it is necessary to form a scientific thesaurus. In this case, the thesaurus, obtained by carrying out the operations of the primary logical interpretation (definition) and operationalisation (division) of the main concepts, includes such terms as: the forecasting of social conflict, the prevention of social conflict, the strategy of its prevention, the diagnosis of social conflict, the main phases, periods, and stages of the dynamics of the conflict, the indicators of social tension, and others.



5) The profile-applied application of the indicated sociological technology to the study of social conflicts in the sphere of sports implies the knowledge of the systemic foundations of multi-level management, including the general and particular features in various sports [9, 12, 16].

Conclusions. The results of the conducted study prove the possibility of constructing a relatively universal model of a sociological study of social conflicts in the sphere of sports. The indicated model includes the logic of constructing a typical structural-content map and a typical scientific thesaurus filling the sociological toolkit.

However, the profile-applied application of this technology for modelling a thematic sociological study is necessarily connected with the knowledge of various levels and fragments of management and organisation in the sphere of sports, sports activity, sports management, and sports education, without which the indicated sociological model is deprived of a practical foundation and turns into a pure abstraction.

Accordingly, each particular profile-applied model of the technology of a sociological study of a social crisis in the sphere of sports will necessarily require the development of a particular thesaurus as well, adapting the sociological toolkit to the specifics of the level and fragment of socio-crisis counteraction under consideration.

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Formation of highly effective sports teams: an acmeological approach to team building

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Abstract

Objective of the study is to reveal the regularities of a sports team achieving the state of “acme” – the highest results of activity; to determine the factors of acmeological development and the criteria of team acme, and to substantiate the technologies for forming highly effective sports collectives.

Methods and structure of the study. The study has a theoretical-methodological orientation and relies on the acmeological approach. Methods of analysing the scientific literature on psychology, pedagogy, and the theory of sports were used, as well as the generalisation of the practical experience of successful teams. Particular attention is paid to the criteria, conditions, and technologies of achieving team acme.

Results and conclusions. It was established that team acme represents an optimal state of the team, characterised by the maximum realisation of potential, synchronicity of actions, creative interaction, and resistance to stress. The key factors of the acmeological orientation of development were identified: high standards, a culture of excellence, innovativeness, systematicity, and personalisation of preparation. The criteria of team acme were substantiated and methods of their diagnosis were proposed. Acmeological technologies of team building were developed: the setting of super-tasks, the creation of a developing environment, a culture of excellence, the individualisation of preparation, and innovative development. A model of the acmeological support of the team is presented, including diagnostic, goal-setting, planning, implementing, controlling, and correcting components. The conditions for achieving acme were determined: qualified leadership, a modern material-technical base, scientific-methodological and psychological support, and a recovery system. Potential obstacles were identified: complacency, conflicts, burnout, and insufficient individualisation. The obtained results can be applied in designing team preparation programmes, developing strategies for achieving peak states, and managing the development of sports collectives.

Keywords: *acmeological approach, team acme, highest achievements, maximum realisation of potential, synchronicity of actions, culture of excellence.*

Introduction. Modern elite sport is characterised by the constant increase of the requirements for the effectiveness of teams [2]. The acmeological approach to team building acquires particular relevance, aimed at the team achieving the state of “acme” – the peak of possibilities and the highest results [1, 3].

The problem of achieving the highest results in sports activity has received coverage in the works of researchers; however, the question of the specifics of team acme and the technologies of its purposeful formation remains insufficiently studied.

Objective of the study is to reveal the regularities of a sports team achieving the state of “acme” – the highest results of activity; to determine the factors of

acmeological development and the criteria of team acme, and to substantiate the technologies for forming highly effective sports collectives.

Methods and structure of the study. The study has a theoretical-methodological orientation and relies on the acmeological approach. Methods of analysing the scientific literature on psychology, pedagogy, and the theory of sports were used, as well as the generalisation of the practical experience of successful teams. Particular attention is paid to the criteria, conditions, and technologies of achieving team acme.

Results of the study and discussion. *Theoretical foundations of the acmeological approach to team building*



The acmeological approach makes it possible to consider a sports team as a developing system capable of achieving the highest results through the maximum realisation of potential [1]. Team acme in this case is understood as an optimal state, characterised by the highest effectiveness of activity, maximum cohesion, and creative interaction.

It is evident that acmeological development has a non-linear character and passes through qualitatively different stages. The initial stage is the formation of basic skills of interaction, the mastering of technical-tactical elements, and the creation of a team culture. The stage of formation is the achievement of the stability of results, the formation of stable patterns of interaction, and the working out of effective ways of solving tasks. The stage of acmeological development is characterised by a qualitative leap in effectiveness. The team achieves a synergetic effect, the interaction becomes intuitive, creative, and adaptive. Let us note that the achievement of team acme requires the creation of special conditions stimulating the maximum realisation of the potential of each participant and of the team as a whole.

Factors of the acmeological orientation of the team's development

The formation of the acmeological orientation of a sports team is determined by the action of interconnected factors.

High standards of activity are the fundamental factor of development. The team must constantly raise the requirements for the quality of work, set ambitious goals, and strive for superiority, creating motivational tension for the search for new possibilities. The culture of excellence represents a system of values, norms, and practices oriented towards the achievement of the highest quality. It includes attention to detail, the striving for impeccability, and a readiness for refinements.

The striving for innovation is manifested in the readiness to experiment with new approaches, technologies, and tactical schemes, making it possible to remain at the leading positions. The systematicity of preparation presupposes a comprehensive approach

to the development of all components: technical, tactical, physical, and psychological, ensuring harmonious development. The personalisation of development means taking into account the individual features of each player and the maximum realisation of individual potential as a condition for achieving team acme.

Criteria of team acme

The state of team acme, in our opinion, is characterised by a set of specific criteria distinguishing it from the ordinary functioning of the team.

The maximum realisation of potential is manifested in the demonstration of results close to the theoretically possible maximum. Each player gives their utmost at the limit of their possibilities, and the interaction ensures a synergetic effect. The synchronicity of actions characterises the highest level of coordination of the participants. The actions become coordinated not only in space and time, but also at the level of intentions, anticipation, and the intuitive understanding of situations.

The creative character of activity is manifested in the ability to find non-standard solutions, to improve, and to create unexpected combinations. Formulaicness gives way to creativity. Resistance to stress impacts means the preservation of high effectiveness in extreme conditions and under the pressure of opponents. Stress factors mobilise additional resources. The ability for self-regulation is manifested in the skill of independently correcting actions, adapting to changes, and maintaining an optimal state (Table 1).

Acmeological technologies of team building

The achievement of team acme requires the application of special acmeological technologies aimed at the maximum mobilisation of the team's potential. Let us briefly present these technologies.

The technology of setting super-tasks presupposes the formulation of goals exceeding current possibilities and requiring a qualitative leap in development. Super-tasks create motivational tension, stimulate the search for new resources, and activate creative thinking.

The technology of creating a developing environment forms the conditions for continuous improve-

Table 1. Criteria and indicators of team acme

Criterion	Indicators	Diagnostic methods	Levels of manifestation
Maximum realisation of potential	Coefficient of the effectiveness of game actions	Video analysis, statistics	High (>90%), medium (70-90%), low (<70%)
Synchronicity of actions	Coordination of movements	Video analysis, experts	Excellent, good, satisfactory
Creative character	Variability of tactical actions	Expert assessment	High, medium, low
Stress resistance	Stability of results	Psychodiagnostics	High, medium, low



ment: access to advanced technologies, the attraction of highly qualified specialists, and the creation of a world-level material-technical base.

The technology of forming a culture of excellence cultivates the striving for the highest quality through the personal example of leaders, a system of incentives, and the creation of an atmosphere of exactingness.

The technology of the individualisation of preparation is based on the maximum consideration of the features of each player. Individual programmes are integrated into the team-wide system.

The technology of innovative development presupposes the systematic introduction of new methods and technologies, constant experimentation, and the analysis of the effectiveness of innovations.

Model of the acmeological support of the team

On the basis of the acmeological approach, we have proposed an integrative model of the support of the team on the way to the highest achievements, including interconnected components.

The diagnostic component presupposes the systematic assessment of the state of the team and the identification of strengths and reserves of development through a complex of methods: video analysis, psychodiagnostics, biomechanical research, and expert assessment.

The goal-setting component includes the setting of a hierarchy of goals: strategic, tactical, and operational. The goals must be ambitious but attainable, concrete, and measurable. The planning component provides for the development of detailed preparation programmes taking into account the specifics of the competitions, the state of the team, and the individual features of the players.

The implementing component includes practical work on the fulfilment of the plans using modern methods of preparation, with particular attention to the quality of the training process and to motivation. The controlling component ensures the monitoring of the preparation, the assessment of the effectiveness of the methods, and the timely correction of the plans. The correcting component presupposes the introduction of changes into the programme on the basis of the results of the control.

Conditions for achieving team acme

The achievement of team acme is possible only with the creation of certain conditions ensuring the maximum realisation of the team's potential.

The leadership of a sports team is a key condition of development. The coach must possess profession-

al knowledge, leadership qualities, and the ability to inspire the team to achieve results.

World-level material-technical provision creates the base for high-quality preparation: modern equipment, sports facilities, medical provision, and means of recovery.

Scientific-methodological support ensures the use of the advanced achievements of sports science, interaction with leading scientific centres, and the attraction of specialists of various profiles.

Psychological preparation is aimed at the formation of an optimal mental state, the development of volitional qualities, the increase of stress resistance, and the cohesion of the collective.

The recovery system maintains high working capacity under conditions of intensive loads through medico-biological, psychological, and pedagogical means.

Obstacles on the way to team acme

On the way to the achievement of team acme, the team may encounter various obstacles requiring overcoming.

Complacency arises after successes. The team loses the motivation for improvement and lowers the requirements for the quality of work. Conflicts in the team destroy unity, reduce the effectiveness of interaction, and divert energy from sports goals. Overtraining and burnout arise from excessive loads or monotony, leading to a reduction of working capacity and an increase in the risk of injuries. Insufficient individualisation hinders the maximum realisation of the potential of individual players, which affects the team-wide result.

Conclusions. Thus, the achievement of team acme in sports represents a complex multifactorial process requiring a systematic acmeological approach. Success in team game sports depends on the creation of special conditions, the application of advanced technologies, and the overcoming of arising obstacles.

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Improving the effectiveness of technical and tactical actions of volleyball players at the stage of sports improvement

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Abstract

Objective of the study is to develop and experimentally substantiate a methodology for optimizing the technical and tactical skills of the libero in the defensive phase at the stage of high sports mastery.

Methods and structure of the study. The experimental study was conducted at the National State University of Physical Education, Sport and Health named after P. F. Lesgaft in St. Petersburg. The sample included 46 male volleyball players aged 18 to 25, with qualifications ranging from 1st category to master of sports. The participants were divided into two equal groups: a control group and an experimental group, each consisting of 23 players. The pedagogical experiment lasted for 36 weeks and involved a strictly structured distribution of training loads across key areas. The main focus was on developing anticipatory abilities (15% of the total workload), special coordination training (20%), and modeling game situations (30%). These components ensured the comprehensive development of defensive skills in competitive environments.

Results and conclusions. Mathematical and statistical processing of the experimental results confirmed the effectiveness of the proposed methodology. The experimental group's performance significantly exceeded that of the control group ($p < 0.05$). In particular, the level of tactical awareness increased by 18.2%, the effectiveness of receiving an attacking shot increased by 14.7%, and the success rate of receiving a serve increased by 9.3%. The most noticeable changes occurred in the anticipation of the spatial and temporal parameters of the ball's movement, which increased by 2.8 times compared to the control group, representing a 22.3% increase.

These findings highlight the crucial role of perceptual and cognitive indicators in the initial stages of training. Their accelerated development provides a solid foundation for improving the technical and tactical skills of volleyball players. The obtained results suggest that the proposed approach can be widely applied in the training process of athletes aiming to achieve high athletic performance.

Keywords: volleyball, libero, technical and tactical actions, defensive actions, the stage of sports improvement, anticipation.

Introduction. Modern volleyball is characterized by a significant increase in the speed of play in competitive activities. This has led to an increase in the importance of the libero position, which was introduced by the International Volleyball Federation (FIVB) in 1998. The libero is a key element of the defensive line, ensuring the effectiveness of the team's defensive strategies. A comprehensive analysis of competitive activities in international volleyball tournaments, taking into account the dynamics of interaction between key players and team members, reveals a significant gap in the effectiveness of receiving the ball. This gap manifests itself

in significant differences in the tactical and technical characteristics of players, which has a significant impact on the overall performance of teams [3]. This aspect indicates a significant potential for improving the level of sports performance at the professional training stage through the optimization of technical and tactical strategies specific to the libero position.

Currently, the scientific and methodological framework for training liberos at the sports improvement stage is fragmented, which leads to a decrease in the importance of cognitive processes such as anticipation and tactical thinking.



Objective of the study is to develop and experimentally substantiate a methodology for optimizing the technical and tactical skills of the libero in the defensive phase at the stage of high sports mastery.

Methods and structure of the study. The methodological basis of this study was based on the principles of a randomized controlled experiment aimed at evaluating the pedagogical intervention through the implementation of the author's training methodology. The experimental intervention was conducted for 36 weeks, from September 2024 to May 2025. The study involved 46 male volleyball players, with an age range of 18 to 25 years and an average sports experience of 8.7 ± 1.9 years. The participants' level of sports qualification was as follows: first category – 39.1%, candidates for master of sports – 43.5%, masters of sports – 17.4%. The inclusion criteria were the role of a libero, the absence of injuries, the regularity of training activities, and the voluntary consent to participate in the pedagogical experiment. The exclusion criteria were chronic diseases that hindered the training process, as well as missing more than 15% of the total number of planned training sessions.

The distribution of participants into experimental and control groups was carried out by the method of stratified randomization. To ensure the homogeneity of groups, the Mann-Whitney U test was used, which demonstrated the absence of statistically significant differences between groups ($p > 0.05$).

The main research method was structured observation, the objectivity of which was confirmed by a high Kappa Cohen score of 0.83 of the expert assessments. The assessment of students' readiness level was carried out through testing aimed at determining the effectiveness of the execution of a strike/serve, the ability to anticipate the trajectory of a strike, tactical literacy (expert assessment), as well as the analysis of movement time and reaction time. The monitoring included the implementation of these tests and video analysis using the Kinovea software. A significant characteristic of the diagnostic complex was the inclusion of subjective assessments of volleyball players as a component of monitoring their readiness to perform defensive actions. Statistical data processing was carried out using IBM SPSS Statistics software version 26, including the Shapiro-Wilk, Mann-Whitney, Student's t-test, and Wilcoxon tests ($p < 0.05$), as well as the calculation of the effect size using Cohen's d. The experimental group, which followed the author's method, conducted training sessions for six weeks at

ninety minutes each, while the control group followed the traditional method.

The author's methodology combines five priority components:

1. Development of anticipatory abilities (15%): implementation of a set of exercises aimed at identifying the kinematic characteristics of attacking actions, as well as performing exercises in conditions of limited visibility.

2. Situational modeling based on the analysis of Super League matches (30% of the time): development and testing of 12 typical game situations characterized by dynamic complexity, including parameters of speed, number of attacking players, force of impact, and blocking.

3. Weekly video analysis (10% of the time), including analysis of your own mistakes and analysis of examples of the game played by highly qualified specialists.

4. Special coordination training (20% of the time) includes exercises aimed at developing reaction speed, spatial orientation, kinesthetic differentiation, and movement adaptability [1].

5. Technical and tactical training (25% of the time) is aimed at improving the skills of receiving the ball, with a special focus on increasing the accuracy of technical elements. Attention is also paid to the details of tactical schemes for player interaction on the playing field [4].

The training process in the experimental group was structured according to the methodology of complication, which includes a weekly detailed analysis based on monitoring data.

Results of the study and discussion. The initial homogeneity of the groups was established by the absence of statistically significant differences at the pre-testing stage ($p > 0.05$ using the Mann-Whitney U test). Although there was a general positive trend at the end of the 36-week study, the experimental group showed a more significant increase in performance.

The results of the study demonstrate a positive trend in the performance of defensive actions in both study groups. However, the most significant improvement in the technique of receiving an attacking blow was observed in the experimental group (EG). In this group, the effectiveness increased by 14.7% (from the initial 42.1% to the final 48.3%, which is confirmed by the $d=0.89$ value, indicating a high level of statistical significance). In the control group (CG), the increase was 10.8% (from 41.8% to 46.3%; d value =



0.52, which corresponds to a moderate effect). The increase in efficiency in the experimental group can be explained by the synergistic interaction between anticipation processes and technical skills. This phenomenon allows players to optimize their movement patterns and, as a result, achieve more accurate ball passes. Thus, the obtained results confirm the hypothesis that the purposeful development of anticipatory abilities, combined with the improvement of technical skills, can significantly increase the level of sports training and the performance of players [2].

Within the experimental group, the quantitative indicators of the effectiveness of receiving the serve demonstrated a less pronounced increase (9.3%) compared to the reception of the attacking shot. This is due to the higher initial level (54.2%) and the lower difficulty of performing this element. Despite this, the intergroup differences remain statistically significant ($p < 0.05$). The effect size in the experimental group ($d = 0.78$) exceeds the result in the control group ($d = 0.41$).

The most significant contrast is observed in the anticipation of the direction of the blow. In the experimental group, the increase was 22.3% (from 47.9% to 58.6%), with a d value of 1.12, which is classified as large. In the control group, the increase was only 7.9% (from 48.3% to 52.1%).

The high results in the experimental group are due to the integration of targeted work on recognizing the kinematic features of attacking actions and the use of video analysis technologies into the training process. In the receiving of an attacking blow, the experimental

group showed an increase of 14.7% ($d = 0.89$) compared to 10.8% in the control group. This is due to the synthesis of improved anticipation and movement techniques. In the receiving of the feed, the dynamics in the experimental group was 9.3% ($d = 0.78$), which also exceeds the results of the control group ($d = 0.41$); less pronounced progress is associated with a high base level of training and a smaller dependence of the element on anticipation. The greatest growth was recorded in anticipation of the direction of the blow: 22.3% in the experimental group ($d = 1.12$ - a very large effect) against 7.9% in the control group. This result was achieved through video analysis and cognitive exercises aimed at developing perceptual skills.

The growth rates of key indicators varied. First of all, perceptual-cognitive metrics improved, and tactics and shot reception developed linearly. The process of mastering the reception of a serve after a long latent period demonstrated a noticeable acceleration. In a real match, the libero of the experimental group showed an average of 4.7 successful defensive actions per set, which significantly exceeded the results of the control group.

Conclusions. The results of the pedagogical experiment indicate that the traditional algorithm for training players in the libero position provides only a moderate positive change in performance, ranging from 5% to 10%. At the same time, the developed integrated approach showed a statistically significant improvement in all the studied parameters with a high effect size.

Table 1. Dynamics of indicators of technical and tactical preparedness of volleyball players of the control and experimental groups ($M \pm SD$)

Indicator	CG/EG	Before the experiment	After the experiment	Growth (%)	p intra-group	d Cohen
Effectiveness of the offensive stroke (%)	CG	41,8 ± 5,2	46,3 ± 5,0	+10,8	<0,05	0,52
	EG	42,1 ± 5,4	48,3 ± 4,6	+14,7	<0,01	0,89
Feed Reception Efficiency (%)	CG	54,6 ± 4,8	57,4 ± 4,5	+5,1	<0,05	0,41
	EG	54,2 ± 5,1	59,3 ± 4,2	+9,3	<0,01	0,78
Anticipation of the direction of the blow (% of correct answers)	CG	48,3 ± 6,7	52,1 ± 6,4	+7,9	<0,05	0,38
	EG	47,9 ± 7,0	58,6 ± 5,8	+22,3	<0,01	1,12
Tactical literacy (points, max. 5.0)	CG	3,21 ± 0,42	3,47 ± 0,39	+8,1	<0,05	0,44
	EG	3,18 ± 0,45	3,76 ± 0,35	+18,2	<0,01	0,98
Movement speed in the defensive stance, herringbone (s)	CG	8,64 ± 0,38	8,47 ± 0,35	-2,0	>0,05	0,31
	EG	8,61 ± 0,41	8,18 ± 0,33	-5,0	<0,01	0,82
Motor Response Time of Choice (ms)	CG	312 ± 28	298 ± 26	-4,5	<0,05	0,36
	EG	315 ± 30	279 ± 23	-11,4	<0,01	0,95



In the experimental group, where the author's methodology was tested, the effectiveness of receiving an attacking shot increased by 14.7%, and the serve improved by 9.3%. It is especially worth noting the pronounced dynamics of the development of tactical literacy, which increased by 18.2%, and anticipation, which increased by 22.3%. The most significant results were achieved in the field of anticipation and tactical skills, which confirms the dominant role of the cognitive component in the structure of the professionally significant qualities of the libero at the stage of sports improvement.

At the initial stages of training, there is an accelerated development of perceptual and cognitive indicators, which serves as a basis for technical and tactical improvement. This pattern is of key importance in planning training cycles aimed at the formation of integrative skills. Video analysis of competitive activity has confirmed its effectiveness in developing tactical thinking and reducing the number of technical errors in volleyball players. The implementation of the proposed methodology allowed to adapt the training process to the conditions of competitive activity, as a result of which the players of the experimental group demonstrated an increased level of efficiency of defensive actions.

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