
# Theory & Practice of Physical Culture

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

# An anthroposociogenic approach to substantiating the mechanisms for promoting a sports career in the context of sanctions in sports

In modern conditions, there is an urgent need to explain and harmonize the functioning of the deep mechanisms of man and society in the aspect of fundamental theoretical theories, one of which is the theory of anthroposociogenesis. Research on the problem of man and society finds a combination and interaction of the personal and social as parts of a whole and their correlation with each other. The main thesis being developed is the principle of integrity and consistency, where the pressure of the whole on its component parts is revealed and the desire to combine and harmonize the components is formed. According to T. Parsons' theory, a person and society, being in conditions of consistency and integrity, adapt to each other through the implementation of functional relationships. As a result, new qualities are generated that enrich integrity. This thesis serves as the main one for building a model of sociogenesis in a historical perspective.

At the same time, in the context of sociogenesis, the features of psycho- and anthropogenesis are generated. The human psyche plays an important role in his adaptation to the environment, learning, communication and social interaction. A developed psyche allows a person to create culture, build complex social relationships and change the world around them. Anthropogenesis creates the biological basis for the development of the psyche. A well-developed brain, nervous system, and sensory organs provide the ability to perceive, process, and store information. Without these biological prerequisites, the development of the psyche would be impossible.

Thus, anthroposociogenesis is the process of human development as a biosocial being, which includes interrelated aspects of biological evolution, socio-cultural development, and individual development. In the context of a sports career, this means that an athlete's success is determined not only by his physical characteristics, but also by social, cultural and psychological factors that are formed during his development and interaction with the environment.

These factors are the driving forces behind the advancement of a sports career in an increasingly complex society. They set the momentum and direction of their promotion for the athlete. Today, political sanctions pressure on athletes may become such a factor.

From the perspective of the theory of anthroposociogenesis, a person is formed in the process of overcoming difficulties. Sanctions create a situation of uncertainty and deprive us of familiar opportunities. In response, adaptation mechanisms are being launched to find alternative ways. An athlete deprived of the opportunity to compete in international competitions is forced to look for other ways to self-actualize and confirm his status. This may lead to participation in less prestigious but accessible competitions, the development of new sports or disciplines, and a focus on domestic competitions and records, which in the long term can be expanded to the boundaries of international sports. Focusing an athlete on his own promotion will allow him to focus efforts in finding and attracting sponsorship funds for both his activities and support for competitions and sports infrastructure on the ground.

As a positive example, the WorldSkills movement, which was conceived back in 1946 in Spain as a professional skills competition between representatives of working professions within a small circle of participants. Currently, this movement has gained international popularity, has its own regulatory and methodological regulations.

Under the conditions of sanctions, an athlete is forced to reconsider his goals and values. Previously, the main focus was on achieving high sports awards at international competitions, but now the focus may shift to additional professional activities such as coaching, sports journalism, sports marketing, and sports diplomacy.

According to psychologists, sanctions in some cases can enhance the psychological stability of an athlete. Overcoming difficulties related to limitations activates resources related to character education and skills to overcome stress in conditions of uncertainty. An athlete can learn to find the positive sides in any situation and use them to achieve their goals. At the same time, it should be noted that not every athlete has the ability to successfully adapt to new conditions. Some of them may experience depression, loss of motivation, and withdrawal from sports.

Based on the theory of anthroposociogenesis, today's political sanctions, despite their negative nature, can become a catalyst for the search for new ways and opportunities for the development of Russian sports. At the same time, an athlete, being a part of society and endowed with personal qualities, being able to effectively adapt to conditions of uncertainty, is able to realize a successful sports career.

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

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

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# Contents

# Video analysis as a biomechanical assessment tool for Nordic walking techniques

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**Abstract**

**Objective of the study** is to scientifically substantiate the methodology of video filming and analysis of Nordic walking technique.

**Methods and structure of the study.** In order to comprehensively study the mechanics of Nordic walking, a study was organized with the participation of the honored athlete, champion of Russia in competitive sports, Irina Markova. The venue for the experiment was the track and field arena of the Lesgaft National State University of Physical Education, Sports and Health. Before the video recording began, contrasting marks with a diameter of 1 centimeter were attached to the key joints of the subject. This was done to ensure their visibility at different angles and in the necessary projections.

**Research results and conclusions.** The method of multi-plane high-speed video recording of Nordic walking turned out to be quite convenient and relatively easy to prepare and set up equipment. The video recording features included high demands on additional lighting with high light output and the presence of two operators whose actions must be clearly coordinated.

The video analysis method using the Kinovea program turned out to be quite labor-intensive, given the number of characteristics being studied, but quite accurate, especially for determining kinematic characteristics (when determining time characteristics, the error was 0.002 s, with spatial characteristics – from 0.01 to 0.02 m).

Using this method, you can easily obtain excellent illustrative material in different planes of an athlete's movement, which can then be used both to study the technique of a specific athlete and for demonstration during training of other athletes.

***Keywords:*** *analysis of Nordic walking technique, biomechanics of Nordic walking, high-speed video filming, multi-camera video filming, biomechanical analysis, analysis using the Kinovea program.*

**Introduction.** "Scandinavian" or "Nordic" walking refers to walking with poles specially designed for this purpose. Three main areas can be distinguished: health-improving, competitive, and "Nordic skills" (where only the technique of execution is assessed). Most of both domestic and foreign studies are devoted mainly to the health-improving area [2, 6, 8, 10].

There are much fewer studies in the field of competitive and "Nordic skills" areas. From the point of view of biomechanics, the technique of Nordic walking has been very poorly studied, especially the relationship between the kinematic parameters of the technique and their influence on the result shown by the athlete. Domestic studies devoted to the biomechanics of Nordic walking mainly consider the inclusion of certain muscles and muscle groups – this confirms its health-improving effect on the entire body as a whole [2].

From the results of foreign studies it follows that the use of poles allows reducing the effort to control the vibrations of the body and can contribute to higher productivity of the body relative to its energy expenditure. Electromyography has proven greater involvement and activation of muscles, especially the upper body, compared to regular walking [9].

Despite the fact that many researchers have proven the differences between Nordic walking and regular walking, a number of authors have shown the absence of significant differences in kinematic, kinetic and dynamic parameters between them. It has been

revealed that biomechanical gait parameters depend most strongly on speed, rather than on walking style [8].

Based on a review of 42 publications devoted to the biomechanical aspects of Nordic walking, it was found that when practicing Nordic walking, compared to regular walking, a number of kinematic characteristics positively increase, such as: distance traveled (+14.8%, $p<0.05$), walking speed (+25.5%, $p<0.05$) and step length (+10.4%, $p<0.05$). However, the walking pace decreases (-6.2%, $p<0.05$) [10].

Thus, the overwhelming majority of sources mainly touch upon the health direction and study the competitive and "Nordic skills" direction much less. In this regard, a study was conducted in which the competitive version of the Nordic walking technique was studied from the point of view of biomechanics.

**Objective of the study** is to scientifically substantiate the methodology of video filming and analysis of Nordic walking technique.

**Methods and structure of the study.** For a detailed analysis of the Nordic walking technique, a study was conducted, in which the Russian champion in competitive disciplines, Irina Markova, participated. The study was conducted in the track and field arena of the NSU named after P.F. Lesgaft. Before filming, contrasting markers measuring 0.01 m were glued to the centers of all the subject's joints so that they were visible in all the necessary planes (Fig. 1).

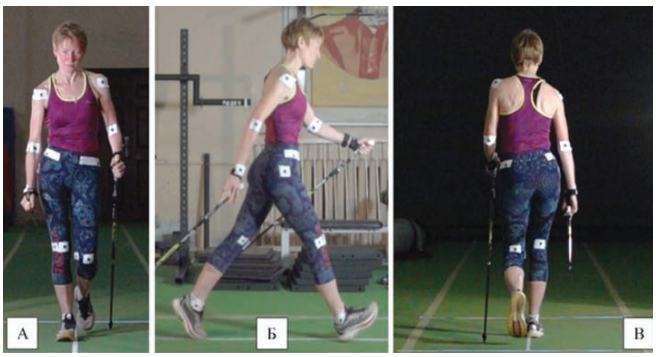


*Fig. 1. Subject marking: A – frontal plane, front view, B – sagittal plane, B – frontal plane, back view*

The place where the experiment was conducted was prepared in advance; the 50 mm thick track surface allowed for the full use of special poles. Markings were applied to the track at the location of the control section for the precise placement of cameras and subsequent determination of the scale. The distance between the marks was 2 m. Additional equipment for filming included two tripods and additional lighting with a total luminous flux of 67,000 lumens. To conduct the study, two cameras, SonyRX 100 m5 and SonyRX 100 m6, were selected, capable of high-speed video recording in the required quality for subsequent video analysis [3, 4].

Based on the results of test video shooting, it was established that when filming in the frontal plane, passing behind the athlete, the hands and poles do not cover the necessary markers, so the video filming of the main attempts was carried out from behind with the second camera. Video filming was carried out simultaneously from two cameras with the "quality priority" settings, mounted on a tripod with a frequency of 500 fps in the frontal plane (from behind) at a distance of 5.6 m and in the sagittal plane (from the side, on the right) at a distance of 8 m from the control lines that the subject passed [4, 5].

To synchronize the video materials from the two cameras, a bright flash of a smartphone flashlight was used, which was visible in the lenses of both cameras. After the video filming, further video analysis of the obtained materials was carried out.

Research results and conclusions. Calculation of all kinematic characteristics and video analysis of the obtained results were performed using the Kinovea 0.9.5 program. based on the experience of our previous studies [5].

Video analysis included the determination of a large number of kinematic characteristics of the motor action in order to understand their relationship with each other. The following were determined: minimum, maximum and average speed of the athlete (m/s), length of a double step (m), angle of forward torso tilt in the sagittal plane (deg), maximum angle of pelvis tilt in the frontal plane from behind (deg), duration of support of the right and left legs (ms), duration of the double phase of support (ms), duration of support of the left and right poles (ms), as well as their total duration of support, duration of transfer (being not on the support) of the left and right poles (ms), as well as their total transfer time, angles of placing the right and left poles on the support (deg), angles of "removal" from the support of the right and left poles (deg).

All obtained characteristics were exported to Excel and subjected to additional calculations, which were subsequently used to obtain statistical data and the final results of the study. The speed of body movement was calculated by the center of the athlete's ear using the "Movement" tool of the Kinovea program. The angle of the torso in the sagittal plane was determined

between the vertical and the line drawn from the center of the ear to the marker glued to the central part of the torso in the area of the apex of the iliac bone of the pelvis (Fig. 2).

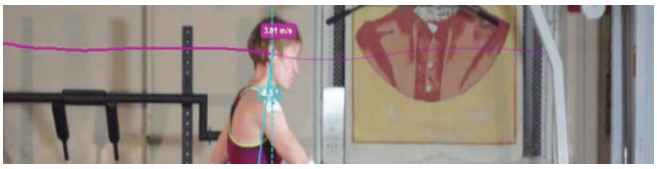

*Fig. 2. Methodology for determining the speed of movement of an athlete and the angle of inclination of the body in the sagittal plane*

In the frontal plane, the angle of tilt (abduction) of the pelvis was determined by video recording in the frontal plane, passing behind the athlete, between the horizontal and the line drawn between the markers glued to the tops of the iliac bone of the pelvis. Its value corresponded to the moment of the greatest tilt of the pelvis, Fig. 3.

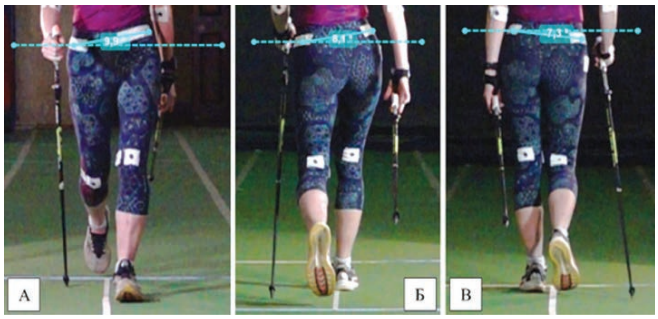


*Fig. 3. Method for determining the angle of the pelvis in the frontal plane: A – frontal plane, front view, first step, B – frontal plane, rear view, first step, B – frontal plane, rear view, second step*

The duration of support was determined based on video recording of the athlete in the sagittal plane frame by frame for each leg with an accuracy of 0.002 s. Then the total time of support was determined by adding these indicators.

**Conclusions.** The method of multi-plane high-speed video recording of Nordic walking turned out to be quite convenient and relatively easy to prepare and set up equipment. The features of video recording include high demands on additional lighting with high light output and the presence of two operators whose actions must be clearly coordinated. The video analysis method using the Kinovea program turned out to be quite labor-intensive, given the number of characteristics being studied, but quite accurate, especially for determining kinematic characteristics (when determining time characteristics, the error was 0.002 s, with spatial characteristics – from 0.01 to 0.02 m). Using this method, you can easily obtain excellent illustrative material in different planes of an athlete's movement, which can then be used both to study the technique of a specific athlete and for demonstration during training of other athletes. An example of such use is shown in Fig. 4.

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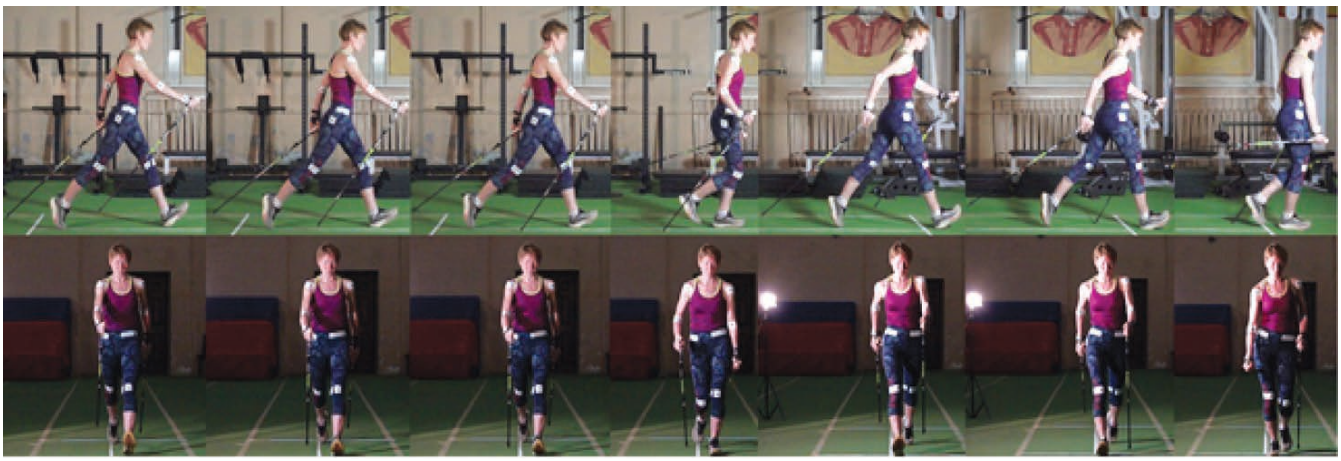

*Fig. 4. An example of using multi-camera video footage of Nordic walking to demonstrate and study an athlete's technique*

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# Optimization of the methodology for assessing the specific endurance of football players

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**Abstract**

**Objective of the study** was to determine the physiological focus of the modified J. Bangsbo football sprint test, where the reliability of data on the development of anaerobic and aerobic energy supply mechanisms ensures the validity and reliability of the assessment of the special endurance of football players.

**Methods and structure of the study.** In the improved version of the football sprint test developed by J. Bangsbo, the emphasis is on simulating competitive conditions. The lactate level in blood taken from a peripheral vein was determined by the sports team doctor using a compact Lactat Scout analyzer 3-5 minutes after the test was completed.

The study involved young athletes from the Youth Sports School "Football Academy" of the Krasnodar Territory, as well as members of the youth teams of the Krasnodar Territory and Rostov Region. The selection of participants was carried out according to the following criteria: age compliance with passport data with an acceptable deviation of ±0.5 years (15.5-16.5 years for 16-year-olds; 16.5-17.5 years for 17-year-olds; 17.5-18.5 years for 18-year-olds) and at least 8 years of training experience.

**Results and conclusions.** Based on the analysis of lactate concentration in blood taken from the peripheral area, the researchers claim that the adapted sprint test can serve as a tool for assessing the efficiency of both anaerobic and aerobic energy supply processes at maximum work intensity. This is evidenced by the relatively low lactate level recorded after the test task in participants of different age groups, which reflects the specific motor activity characteristic of football players during the game.

***Keywords:*** *physiological orientation, modified football sprint test by J. Bangsbo, aerobic mechanisms, energy supply, validity, reliability, assessment of special endurance, competitive conditions.*

**Introduction.** The modern game of football is characterized by alternating high-speed and low-intensity actions both with and without the ball, the player performing accelerations and sprints against the background of self-regulation of motor activity. It is also known that the intermittent nature of a football match can be characterized as a constant sequence of short actions of the player at maximum and high power with a change to relative inaction.

Of the most informative parameters for assessing the motor activity of football players, experts believe that the assessment of the ability to repeatedly perform maximum-intensity running. It is this ability of the player, as a rule, that provides him with certain advantages over the opponent during the game. Episodes of maximum activity of football players, in which the fight for the ball takes place, according to the observations of researchers [2], last up to 4-5 seconds. After that, episodes of relative inaction follow, lasting from 30 to 60 seconds.

Consequently, the intermittent nature of a football match can be characterized as a constant sequence of short actions of the player at maximum and high speed with a change to relative inaction (recovery). In this regard, it is noted that performance in football largely depends on both anaerobic (sprints) and aerobic (recovery rate) capabilities of the players' bodies. Athletes work, on average, at 70% of their maximum oxygen consumption, at 80-90% of their maximum heart rate, with a blood lactate level of

about 2-10 mmol / l-1 [9], while they cover a distance of 8-12 km during a football match at a professional level [7, 8].

All these and a number of other features of the manifestation of motor activity of football players establish increased requirements for special endurance, ensuring such game actions. This necessitates the use of more specific assessment methods that would fully take into account these features, and the results shown by athletes would characterize specific aspects of special endurance of football players from the standpoint of competitive performance. For this purpose, interval sprint tests are used in the practice of such sports, in which the work is provided by aerobic processes by 38%, anaerobic glycolysis by 45% and anaerobic alactic processes by 17% [10].

Consequently, interval sprint tests provide data that allow us to evaluate to a greater extent the anaerobic capabilities of the body [11], and reflect mainly the ability to resist fatigue in conditions of running intensive segments exceeding the limit of 4-5 seconds identified for football players. The closest in terms of established requirements is the football sprint test developed by J. Bangsbo [6] and studied by us from the standpoint of physiological orientation [4]. Nevertheless, the issue of developing more effective methods for assessing the special endurance of football players in conditions as close as possible to competitive ones remains relevant to this day.

**The aim of the study** is to determine the physiological focus of the modified J. Bangsbo football sprint test, where the reliability of data on the development of anaerobic and aerobic energy supply mechanisms ensures the validity and reliability of the assessment of the special endurance of football players.

**Methods and structure of the study.** The modification of J. Bangsbo football sprint test involved changes in the conditions of implementation, which are as close as possible to competitive ones: the time allotted to a football player for recovery after performing the next sprint and returning to the starting line is no more than 60 s; the football player independently controls the process of recovery, returning to the starting line and performing a sprint based on a subjective assessment of his own physical capabilities; the athlete begins the subsequent sprint from a mobile state from within the permitted 5-meter zone located behind the starting line; the coach records the start time of the sprint when the football player starts from a mobile state. The concentration of lactate in the peripheral blood was measured by the team's sports physician using a portable Lactat Scout analyzer at 3-5 minutes of the recovery period after the sprint test. This made it possible to assess the involvement of the anaerobic glycolytic system in the energy supply of the football player's movements during the modified sprint test [3]. Since the test involves long-term running loads, the maximum concentration of lactate in the peripheral blood, according to numerous observations [1, 5], is detected from the third to the fifth minute of recovery.

To determine the validity and reliability of assessing the special endurance of football players, a comparison of the results of the modified J. Bangsbo sprint test was conducted among young men of different ages.

The survey was conducted with athletes from the Youth Sports School "Football Academy" of the Krasnodar Territory, the national youth teams of the Krasnodar Territory and the Rostov Region. Inclusion criteria for the group of subjects: passport age of football players ±0.5 years (16 years old – 15.5-16.5 years old; 17 years old – 16.5-17.5 years old; 18 years old – 17.5-18.5 years old), training experience of at least 8 years.

To achieve maximum productivity in the proposed control exercise, the indicators of the total time of the sprint test, the best and worst time, the difference between the best and worst time of a single sprint were ranked and points were assigned for each studied parameter. The sum of points for all test parameters determined the place of the football player in the overall ranking of the group, which created additional motivation to achieve maximum results in the considered control exercise.

Testing was conducted during the rest period after official competitions. All subjects gave voluntary informed consent to be included in the survey groups in accordance with the Helsinki Declaration of the World Medical Association, written permission to process personal data. Statistical analysis of the experimental data was performed using the program "Statistica 13.0". To characterize the dynamics of the indicators, the arithmetic mean (x ) and standard deviation ( ) were calculated. The critical level of significance (P) when testing statistical hypotheses was taken as 0.05.

**Results and conclusions.** The table presents the results of the modified J. Bangsbo sprint test for football players of the age groups studied.

*Results of the modified J. Bangsbo sprint test for junior football players*

| Parameters | | Best time, (s) | Worst time, (s) | Difference, (s) | Total time, (s) |
|---|---|---|---|---|---|
| Test results, (±σ) | 16 лет, (n=41) | 6,26±1,3 | 6,38±1,3 | 0,12±0,2 | 270,1±4,8 |
| | 17 лет, (n=63) | 5,91±1,4* | 5,97±1,4* | 0,06±0,1* | 242,5±5,4* |
| | 18 лет, (n=37) | 5,01±1,2** | 5,03±1,1** | 0,02±0,06** | 228,4±4,7** |
| Blood lactate concentration, (±σ) | 16 лет, (n=41) | 7,8±1,4 mmol/l-1 | | | |
| | 17 лет, (n=63) | 6,1±1,5* mmol/l-1 | | | |
| | 18 лет, (n=37) | 4,8±1,2** mmol/l-1 | | | |

*Note: * – level of significance of differences between 16 and 17 year old football players; ** – level of significance of differences between 17 and 18 year old football players.*

As a result of comparison of the obtained data, changes in the indicators of all four considered parameters of the sprint test assessment, characterizing individual aspects of the special endurance of football players, were revealed. It can be argued that the unregulated 60-second rest pause in the test modified by us, compared to the regulated conditions of the original sprint test by J. Bangsbo in 25 seconds, contributes to a more rapid deployment of the aerobic mechanism in the energy supply of the working muscles, and also allows you to independently regulate the load, and receive more relevant information about the special endurance of football players. When analyzing the results obtained for the indicators of the difference between the minimum and maximum sprint time, a stable positive trend was noted, indicating the conditions of the testing task, under which the possibilities for the recovery of the body increase.

This situation is typical for most episodes of a football match, where high-intensity segments are replaced by relative inaction. This is confirmed by the absence of under-recovery of the football players' bodies during the performance of seven repetitions of sprints (the difference between the worst and best sprint times), which took place in the J. Bangsbo sprint test and was manifested in a significant "drop" in the results [4]. Considering that the lactate levels after performing the testing exercise in football players were relatively low (4.8-7.8 mmol/l-1), it can be concluded that the modified sprint test is suitable for assessing both the anaerobic and aerobic capabilities of the body under conditions of maximum exercise performance.

**Conclusions.** Thus, the modified sprint test by J. Bangsbo allows obtaining reliable results characterizing other aspects of special endurance during intermittent work than the original sprint test.

The modified sprint test, which includes four parameters for assessing special endurance, reflects the involvement of all energy supply mechanisms in specific work and makes it possible to control changes in the athlete's behavior when performing a testing task under conditions close to competitive ones.

Moreover, the sprint test under consideration contains a set of tasks that are optimal in composition and sequence, the nature of movements and pauses for rest, which can be used as a valid and reliable method for assessing the special endurance of football players, since it has undergone an experimental test with the participation of sports doctors and coaches and received a positive assessment.

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# Improving the precise motor skills of aircraft control hands

UDC 378

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**Abstract**

**Objective of the study** is to identify the optimal way to hold the drone controller sticks and develop a set of exercises to improve piloting skills.

**Methods and structure of the study.** The drone operators showed well-developed small muscles of the forearms and hands involved in controlling the drone. The dominant and most effective ways of holding the controller and manipulating the joysticks while piloting the drone were identified. Exercises aimed at improving fine motor skills were selected. The experiment involved students of the first and second years of study at the Ulyanovsk Institute of Civil Aviation. Sociological tools (interviews, questionnaire filling), analytical and synthetic approaches, as well as the competitive method were used.

**Results and conclusions.** When analyzing the control of the UAV using the control panel, it was found that the main load is carried by the following muscle groups of the hands: the muscles of the middle part of the hand, the muscles of the posterior surface of the forearm (both superficial and deep), the deep muscles of the anterior surface of the forearm, as well as the muscles controlling the movements of the thumb. It has been experimentally confirmed that using the pinch grip of the sticks provides increased control accuracy, while controlling the sticks with only the thumbs allows for a higher reaction speed. The majority of students (70%) prefer the pinch control method. The introduction of specialized physical exercise complexes into the educational process enabled the team of cadets from the experimental group to demonstrate high results in UAV piloting competitions.

***Keywords:*** *fine motor skills of the hands, unmanned aircraft, comfortable grip, external pilot, operator, remote control sticks, control efficiency, small arm muscles, remote control hold, exercises.*

**Introduction.** The Order of the Government of the Russian Federation approved the "Strategy for the Development of Unmanned Aviation in the Russian Federation for the Period up to 2030 and for the Future up to 2035" (2023). It emphasizes that today the pace of implementation of unmanned aviation technologies outpaces the capabilities of the education system to train personnel in this area, there is an increase in the demand for training specialists from employers. In the future, the demand may reach a million specialists. Of these, 60% should be operators of unmanned systems (external pilots) [6]. Currently, the implementation of the program for training specialists in this area is based on the Federal Project "Personnel for Unmanned Aircraft Systems" (2024), which can be implemented on the basis of educational organizations.

In connection with the development of unmanned systems in aviation, sea, rail and road transport, today there is a special interest in the topic of improving the coordination of finger movements. It is known that the motor (movement) processes that a person possesses give an idea of the level of development of his coordination and intelligence [2].

Fine motor skills can be considered as the ability to perform tasks that require coordinated actions of the nervous, muscular and skeletal systems, the work of analyzers, the ability to perform small movements of the fingers. Fine motor skills of the hands interact with higher mental functions and properties of consciousness: attention, imagination, thinking, visual-spatial

perception, motor and visual memory, speech. Therefore, the development of new methods using various approaches to the development of fine motor skills for adults is a relevant area in physical education. Physical education at a university is the most important vector for solving the problems of training a specialist [4].

With properly organized classes, in the process of systematic work, the hand gains confidence, accuracy, and the fingers become mobile, movements – highly coordinated. Prospects for the development of systems and means of complexes with unmanned aerial vehicles should take into account the role of the human factor in their control [1, 5].

**Objective of the study** is to determine the most comfortable grip for the UAV remote control sticks and select exercises aimed at improving the efficiency of unmanned aerial vehicles (UAV) control.

**Methods and structure of the study.** The experiment involved 28 1st-2nd year cadets studying at the UI GA in the direction of training 25.03.03_04 "Organization, support and maintenance of unmanned aerial systems flights". The efficiency of specialists is affected by many unfavorable factors associated with emotional stress, adverse weather conditions, high physical activity, monotonous monotonous work with maintaining a working posture, etc. Sociological methods (survey, questionnaire), analysis and synthesis, and a competitive method were used.

Results and conclusions. With the involvement of specialists from the Department of Human Biology and Fundamentals of Medical Knowledge of the Federal State Budgetary Educational Institution of Higher Education "UlGPU named after I.N. Ulyanov" identified the human muscles involved in controlling an unmanned aerial vehicle by acting on the remote control sticks (see table).

The main device for controlling the UAV is the remote control (transmitter). The UAV remote control usually has two sticks: the left one is responsible for moving the aircraft up and down, as well as yaw; the right one is for roll and pitch. In this case, 2-4 fingers work; as a rule, the little finger is not involved in the control. There are two ways to hold and act on the sticks:

*Muscles involved in the action of the fingers on the sticks*

| Muscle | Function |
|---|---|
| Brachioradialis muscle | Supinates the forearm in a pronated position; pronates the supinated forearm; flexes the arm at the elbow joint |
| Flexor carpi ulnaris | Flexes the wrist, flexes the elbow joint |
| Extensor carpi ulnaris | Extends the wrist; extends the arm at the elbow joint |
| Flexor carpi radialis | Flexes the wrist and pronates the forearm, flexes the elbow joint |
| Pronator teres | Pronates the forearm |
| Pronator quadratus | Synergist of the pronator teres |
| Palmaris longus muscle | Tenses the skin of the palm and participates in flexion of the wrist, flexes the elbow joint |
| Flexor digitorum superficialis | Flexes the middle phalanges and participates in flexion of the wrist, flexes the elbow joint |
| Extensor carpi radialis longus | Extends the wrist |
| Extensor carpi radialis brevis | Extends the wrist |
| Flexor pollicis longus | Flexes the nail phalanx, as well as the entire thumb |
| Deep flexor digitorum | Bends the nail phalanges and partly the hand |
| Extensor digitorum | Extends the fingers and hand; extends the arm at the elbow joint |
| Supinator (forearm muscle) | Supinates the forearm and hand |
| Longus abductor pollicis muscle | Abducts the thumb and hand |
| Flexor pollicis brevis | Flexes the thumb |
| Extensor pollicis brevis | Extends and abducts the thumb |
| Extensor pollicis longus | Extensor pollicis longus |
| Extensor of the index finger | Extensor of the index finger |
| Abductor pollicis brevis | Abducts the thumb |
| Adductor pollicis muscle | Adducts and partially opposes the thumb |

1) pinching the sticks  the aircraft is controlled with two fingers of each hand: the thumb and index finger. With this method, the outer pilot “pinches” the stick. In this case, the middle and ring fingers are on the front edge of the remote control and can press the buttons and toggle switches located there (Fig. 1).

2) thumbs – only the thumbs work, and the index and middle fingers are on the front edge of the remote control and can also press the levers and buttons (Fig. 2).


*Fig. 1. Pinch action*


*Fig. 2. Impact with thumbs*

The choice of the method of holding and acting on the sticks depends on the development of fine motor skills of the hands and personal preferences of the remote pilot. A survey of cadets studying at the UI GA showed that pinching the sticks provides more precise control, while the action with the thumbs is faster. The method of acting by pinching the sticks is used by 70% of the surveyed cadets. It should be noted that UAVs can be light and heavy, respectively, they have different speeds and flight characteristics. Light (small) UAVs are more difficult to control: they are high-speed, maneuverable, and require a quick reaction from the remote pilot to perform various maneuvers. Heavy UAVs have a certain inertia in flight. Different categories of UAVs impose corresponding requirements on the strength, endurance, dexterity and coordination of the small muscles of the operator. Based on this, the work of an external pilot is a new type of work activity that requires the development of certain muscle groups and professionally important physical qualities.

For the experimental group (12 cadets), exercises were selected and used during the fall semester to develop fine motor skills of the hands. The exercises were classified as follows: physical exercises with small objects, coordination and dexterity exercises, sensory exercises, and exercises on special simulators. Such simulators included interactive tables and sensorimotor panels for performing certain tasks. The panels have a set of different surfaces, buttons, and switches with which the palms and fingers of the students must interact. At the same time, the muscles of the back, neck, and chest are strengthened.

An important aspect of training external pilots is the use of modern information technology to develop fine motor skills. Among the numerous applications and interactive games (for personal computers and smartphones), we have identified specially developed tools for training coordination and correcting finger movements. During physical training, the training effect is transferred, increasing the ability to withstand extreme factors of UAV control.

Thus, physical training for the work of unmanned aerial vehicle operators seems to us to be a very important factor in the development of skill. Improving the performance of the external pilot is possible under the condition of using training effects that exceed the level of capabilities to which the body is adapted and force it to new adaptive reactions [3]. In this case, two problems are solved: the level of functional capabilities of the body is increased and morphological changes in the musculoskeletal system are activated. The solution to these problems was implemented in the course of experimental work.

**Conclusions.** The conducted study allowed us to determine the current state of unmanned aviation in Russia and its personnel support, to develop a strategy for long-term physical and professional competitive training of external UAV pilots. The use of specially developed sets of exercises in the educational process of the Civil Aviation Institute, based on the main methods of developing fine motor skills, made it possible to obtain a certain result: successful performance in the competition in the skill of controlling unmanned aerial

vehicles by a team consisting of cadets of the experimental group (1st place).

The cadets of the control group took 6th place out of 10 participating teams. The competition was held within the framework of the national project "Growth Point". In March 2024, the staff of the Department of Physical Education and Sports of the Faculty of Training of Aviation Specialists of the Civil Aviation Institute published a teaching aid "Development of Fine Motor Skills of Hands of Unmanned Aircraft System Operators" intended for students of all areas and profiles of training, as well as teachers of physical education of educational institutions of civil aviation, and a textbook "Physical Education and Sports in Civil Aviation Universities" was published. Thus, the development of fine motor skills of UAV operators is a very important element of professional and applied physical training of cadet pilots.

Methods and means of developing fine motor skills can and should be integrated into physical education classes for students at different stages of the educational process. Such classes not only improve physical condition, but also contribute to better assimilation of educational material, fill leisure time, and allow you to acquire professionally important motor skills. This becomes possible with constant practical work, which improves the fine motor skills of the hand muscles.

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# Changes in stroke performance in 13-14 year old swimmers over an annual training cycle

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**Abstract**

**Objective of study** is to identify the dynamics of kinematic parameters of stroke technique in swimmers aged 13-14 years in the structure of the annual cycle.

**Methods and structure of the study.** The experiment involved 28 swimmers aged 13-14 years, I-II sports category. To assess the level of technical training, a method of computer video analysis of swimmers' movements during the 25 m breaststroke at maximum speed was used. In addition, the swimmers' anthropometric parameters were measured and the training loads were analyzed. The material was processed using mathematical statistics methods.

**Results of the study and conclusions.** In swimmers training according to the generally accepted program, only 7 of the 12 studied kinematic parameters showed reliable changes during the year. The observed increase in the parameters of the speed and acceleration of the hand movement in the pull-up phase indicates a decrease in the quality of the stroke, while the parameters of the speed and acceleration of the hand movement in the push-off phase did not show reliable changes. The detected discrepancies in the speed indicators in the main phases of the stroke may be the result of excessive power loads, in which the maximum effort is manifested at the beginning of the movement and negatively affects the formation of kinematic indicators in the pull-up phase, which in turn dictates the need to combine physical and technical training.

The pace of movements demonstrated a reliable decrease during the year, while the length of the "step" significantly increased only by the end of the year. The detected increase in the depth of immersion of the hand by the end of the year can be explained by the natural increase in anthropometric indicators. Maximum swimming speed demonstrated reliable dynamics only by the end of the year.

Thus, with the generally accepted version of the training process structure, the changes in the stroke structure detected during the year indicate an ineffective ratio of its components. This is evidenced by an increase in the speed and acceleration of the hand movement in the pull-up phase and the absence of the same in the push-off phase. This is also confirmed by an insufficient increase in the maximum swimming speed, which significantly improved only by the end of the year.

***Keywords:*** *educational and training stage, dynamics of kinematic parameters, stroke technique, swimmers aged 13-14, annual cycle, experiment, qualification I-II sports category, technical training.*

**Introduction.** The educational and training stage of swimmers' preparation, covering the age of puberty, is one of the important ones in the formation and further improvement of the technique of the chosen swimming method [1, 5, 6, 7]. The main problem at this stage is the difficulty of realizing the increased strength capabilities of young swimmers [3]. The achieved level of strength abilities is not realized to the proper extent in water, since the specifics of the aquatic environment do not allow this. And only by improving intermuscular coordination, that is, the technique of movements in water, it is possible to increase the level of special training to a certain extent. All this indicates the need for a detailed study of the biomechanical characteristics of the stroke technique of young swimmers in order to identify the degree of its changes and find ways to combine physical and technical training.

**Objective of the study** is to identify the dynamics of the kinematic parameters of the stroke technique

in swimmers aged 13-14 years in the structure of the annual cycle.

**Methods and structure of the study.** The experiment involved 28 male swimmers aged 13-14, I-II sports category qualification, specializing in freestyle swimming. The stroke parameters were measured while swimming a 25 m distance using the front crawl at maximum speed. To assess the kinematic parameters of the stroke technique, computer video analysis was used, the essence of which was to film the swimmer's movements frontally and from the side with an underwater high-resolution Sony HD video camera, followed by processing the resulting video material in the Silicon Coach Pro program. Anthropometric indicators were measured with a stadiometer to measure the subjects' body length and a centimeter tape to measure the arm length. Training loads were analyzed regularly. Over the entire study period, 3 tests were conducted: at the beginning, middle and end of the annual cycle. The material was processed using mathematical statistics methods.

**Results and conclusions.** The training process of athletes was carried out in accordance with the Federal Standard of Sports Training in the sport of "swimming" (FSST) and the annual plan covering the autumn-winter and spring-summer periods. In the first half of the

*Dynamics of kinematic parameters of the stroke in the annual cycle (x±m)*

| Indicators | Testing | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Speed of hand movement in the grip phase (m/s) | 0,604±0,01 | 0,609±0,01 | 0,613±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,35); $p_{1-3}$>0,05 (0,64); $p_{2-3}$>0,05 (0,28) | | |
| Speed of movement of the hand in the pulling phase (m/s) | 0,509±0,01 | 0,552±0,01 | 0,579±0,01 |
| p (t) | $p_{1-2}$<0,01 (3,04); $p_{1-3}$<0,001 (4,95); $p_{2-3}$>0,05 (1,91) | | |
| Speed of movement of the hand in the push-off phase (m/s) | 1,952±0,02 | 1,957±0,01 | 1,961±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,35); $p_{1-3}$>0,05 (0,64); $p_{2-3}$>0,05 (0,28) | | |
| Acceleration of hand movement in the grip phase (m/s$^2$) | -0,420±0,01 | -0,425±0,01 | -0,431±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,35); $p_{1-3}$>0,05 (0,78); $p_{2-3}$>0,05 (0,42) | | |
| Acceleration of the wrist movement in the pull-up phase (m/s$^2$) | 0,179±0,01 | 0,208±0,01 | 0,225±0,01 |
| p (t) | $p_{1-2}$<0,05 (2,05); $p_{1-3}$<0,01 (3,25); $p_{2-3}$>0,05 (1,20) | | |
| Acceleration of the hand movement in the push-off phase (m/s$^2$) | 1,100±0,01 | 1,106±0,01 | 1,116±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,42); $p_{1-3}$>0,05 (1,13); $p_{2-3}$>0,05 (0,71) | | |
| Length of the hand movement trajectory in the capture phase (m) | 0,385±0,01 | 0,389±0,01 | 0,392±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,28); $p_{1-3}$>0,05 (0,49); $p_{2-3}$>0,05 (0,21) | | |
| Length of the trajectory of the hand movement in the pull-up phase (m) | 0,526±0,01 | 0,532±0,01 | 0,555±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,42); $p_{1-3}$<0,05 (2,05); $p_{2-3}$>0,05 (1,56) | | |
| Length of the trajectory of the hand in the push-off phase (m) | 0,200±0,01 | 0,205±0,01 | 0,209±0,01 |
| p (t) | $p_{1-2}$>0,05 (0,35); $p_{1-3}$>0,05 (0,64); $p_{2-3}$>0,05 (0,28) | | |
| Water speed (dp/min) | 76,058±0,45 | 74,148±0,32 | 72,795±0,31 |
| p (t) | $p_{1-2}$<0,01 (3,46); $p_{1-3}$<0,001 (5,97); $p_{2-3}$<0,01 (3,04) | | |
| Step length (m) | 1,331±0,01 | 1,360±0,01 | 1,376±0,01 |
| p (t) | $p_{1-2}$>0,05 (2,05); $p_{1-3}$<0,01 (3,18); $p_{2-3}$<0,05 (3,04) | | |
| Brush immersion depth (cm) | 44,950±0,01 | 44,968±0,01 | 44,986±0,01 |
| p (t) | $p_{1-2}$>0,05 (1,27); $p_{1-3}$<0,05 (2,55); $p_{2-3}$>0,05 (1,27) | | |
| Maximum speed, m/s | 1,841±0,01 | 1,863±0,01 | 1,885±0,01 |
| p (t) | $p_{1-2}$>0,05(1,56); $p_{1-3}$<0,01 (3,11); $p_{2-3}$>0,05 (1,56) | | |

annual cycle, special attention in physical training was paid to aerobic (55%) and aerobic-strength (45%). In the second half of the annual cycle, the emphasis in the work was aimed at developing strength (60%) and speed-strength qualities (40%), while the volume of loads in the aerobic zone was significantly reduced. At the same time, 12% of the total training volume was allocated to technical training in the first half of the annual cycle and 10% in the second. The results of testing swimmers in the annual cycle are presented in the table.

As can be seen from the table, during the year only 7 out of 12 indicators showed reliable changes. At the same time, in the pull-up phase, which is involved in creating the support, there were changes towards an increase in the speed parameters of the stroke, which do not characterize the stroke as effective due to the fact that when performing this phase, the hand must use the laminar layer of water, taking turbulence outward.

However, as the results of this study showed, in athletes, the observed increase in the speed of the hand movement in the pull-up phase indicates a "breakthrough" of the laminar layer, provoking a decrease in the lifting force and an increase in wave (turbulent) resistance.

A decrease in the quality of the stroke in the pull-up phase is also indicated by a reliable increase in the acceleration parameter of the hand movement, which should be considered in unity with the speed of the hand movement due to their close relationship [2]. The only exception indicating positive changes in the pull-up phase is a reliable increase in the length of the trajectory of the hand movement, and only by the end of the year. In our opinion, the noted shortcomings are the result of excessive power loads, in which the maximum effort is manifested at the beginning of the movement and negatively affects the formation of kinematic indicators in the pull-up phase. This, in turn, dictates the need for adequate conjugation of physical and technical training.

The pull-up phase is the supporting part of the stroke, which predetermines the quality of the execution of the following push-off phase, however, the parameters of the speed and acceleration of the hand movement in the latter did not change reliably. In the push-off phase, the development of effort to achieve maximum swimming speed is due to the phenomenon of cavitation (performance of locomotion by the mover in conditions of a hydrodynamic flow vacuum), which creates even greater emphasis. Under these conditions, using the force of impulse transfer between the muscles, the hand performs a powerful final movement associated with the "overlap". However, as the results of this study showed, the absence of reliable changes in the indicators of the speed and acceleration of the hand movement in the push-off phase is probably associated with insufficiently effective implementation of special strength loads of athletes, which do not involve an accentuated effect on the phase structure of the stroke. That is, the final part of the stroke, the most significant for the propulsion of the cycle, is not performed effectively enough by the swimmers under study.

Another indicator, the rate of movement, demonstrated a reliable decrease during the year, which should be understood as a positive factor. At the same time, the length of the "step" significantly increased only by the end of the year. The rate of movement and the length of the "step" are criteria for the quality of the stroke and largely determine the level of technical training. The picture observed in the present study also indicates the ineffectiveness of changes in the components of the stroke. Earlier in our work, it was shown that for an effective ratio of the rate of movement and the length of the "step", it is advisable to use special strength-oriented means, therefore the discovered relationship of these parameters indicates the need to optimize strength-oriented exercises in the preparation of swimmers [2, 3, 4]. The detected increase in the depth of immersion of the hand can be associated with a natural increase in anthropometric indicators.

The integral indicator and criterion of the implementation efficiency of the technique is the maximum swimming speed [1, 2]. As the results of this study showed, this parameter demonstrated reliable dynamics only by the end of the year, although an earlier increase should have been expected.

**Conclusion.** Thus, with the generally accepted version of the training process structure, the changes in the stroke structure identified during the year indicate an ineffective ratio of its components. This is evidenced by an increase in the speed and acceleration of the hand movement in the pull-up phase and the absence of the same in the push-off phase. This is also confirmed by an insufficient increase in the maximum swimming speed, which reliably improves only by the end of the year.

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# Methodological and scientific support for student sports teams

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**Abstract**

**Objective of the study** is aimed at confirming the effectiveness of the psychological support provided to the women's volleyball team by the coaching staff to improve the performance of the game.

**Methods and structure of the study.** An anthropometric profile of the "typical" player of the University team and, in general, the teams participating in the first league of the Russian Championship has been created. Testing of the sports team was organized and carried out. The technique used by a psychophysiologist when working with athletes is described. A set of measures has been developed and implemented for the psychological and psychophysiological support of the team.

**Research results and conclusions.** The use of a team approach in the training of the women's volleyball team demonstrated a clear correlation with improved results at district and national competitions. The practice of the coaching staff and a psychologist working together with a team consisting of candidates for the Master of sports has proven its effectiveness, which is confirmed by the successful performances of the university team in the 2023-2024 and 2024-2025 seasons. This conclusion is supported by comparing the performance results of this team with the achievements of teams that have undergone similar training in the same region. The data obtained can be applied to work with semi-professional volleyball teams in regions where there are no super league teams in sports schools and Olympic reserve schools.

***Keywords:*** *psychological support, women's volleyball team, improvement of game performance, psychology, psychophysiology, team approach, training process, competition results, teamwork.*

**Introduction.** Many athletes who are part of the “elite” of sports cannot imagine working for results without the help of a team of coaches, doctors, physiologists, media professionals, administrators and psychologists. According to recent years, the most successful athletes in Europe have been working with sports psychologists since childhood, and this has become the norm for the current generation of champions [3].

In individual sports, 5-7 “narrow” specialists interact with athletes simultaneously in the training process, and they are also necessarily accompanied by a physiotherapist, sports physiologist and psychologist.

Admission to training sessions, competitions and physical activity in general is regulated at the legislative level by the provisions of the Order of the Ministry of Health No. 1144. Since 2022, a psychologist / psychotherapist has been included in the list of specialists who give an opinion on the admission of a child athlete to training and competitive activities. The need for psychological support is increasingly a request from parents of young athletes who must not only withstand physical stress during training, survive age crises, but also combine educational activities with competitive activities, and realize their needs in communicating with peers.

**The purpose of the study** is to substantiate the effectiveness of the methodology of psychological support of the women’s volleyball team by a team of coaches in improving the team’s game results.

**Methodology and organization of the study.** An anthropometric passport of the “average” player of

the University team and, in general, teams of the first league of the Championship of Russia was compiled; testing of the sports team was organized and conducted, the methodology of the psychophysiologist's work with athletes was described, a set of measures for working with the team in the field of psychology and psychophysiology was developed and tested.

**Results of the study and their discussion.** In the practical part of the work, the authors identified three stages. At the first stage, the anthropometric data of the players of the University women's volleyball team was collected. The team trains at PetrSU from September 2023 to May 2025. The study involved 17 players of the control team aged 16 to 40 years. The data for comparison was obtained from 23 teams of the first league of the Russian Championship from 20 regions, the data of 306 players were analyzed. Direct testing of the Karelian team players was carried out at the psychological and pedagogical laboratory of the Institute of Physical Culture, Sports and Tourism using the equipment of the ANO "Center for Innovations in Physical Culture and Sports of the Republic of Karelia" The team competed in district and all-Russian competitions in two seasons. Based on the results of performance in district competitions – the qualifying stage of the Russian Championship among teams of the first league in the Northwestern Federal District, the team progressed from third to first place, and in the 2024-2025 season showed the 6th result in the final of the Russian Championship[1].

The table shows the anthropometric data of the team in the 2024-2025 season, as well as the ratio of the number of players by position in the teams.

The average indicators of a "universal player" in the University team/team of the Russian First League Championship are as follows: average height of players is 174.5-175.33 cm; average age is 20-24 years.

Having analyzed the data of the almanac of the Russian Championship among women's teams of the first league in the 2024/2025 season, we can conclude that PetrSU players are standard players according to anthropometric data – they do not have an advantage in height and age. It can be noted that the diagonal player significantly exceeds the average age with a 5 cm advantage in height. From the general statistics, we can highlight the short stature of the setters, which affects the pattern of the game.

At the second stage of the study, the authors conducted a functional diagnosis of the players. During the research, aerobic endurance was studied using the 12-minute Cooper test. To determine speed-strength endurance, the authors used the "Wingey test", repeated sprints with short rest and a vertical jump test.

Muscle strength was determined by dynamometry using an electronic dynamometer, the upper and lower limbs, their peak and average isometric strength, as well as symmetry between the limbs, imbalances between agonists and antagonists were examined.

During the study, the authors studied dynamic and static coordination using the "Functional screening of movement" method, the "Y balance" test. The cardiovascular and autonomic nervous system were assessed by assessing the variability of the heart rate at rest and during an orthostatic test in two varieties, from a sitting and lying position [2]. The psychological diagnostics block included determining the personal characteristics of the athletes, motivational features and current states reflecting their readiness to work in non-standard situations, at the peak of their strength and in the conditions of a "foreign" gym. One of the methods for assessing athletes was a screening method called the abbreviation "KOMPAS": "Categorical assessment of the mental strength and adaptability of

[1] Spectator boom at the Tomsk Arena. First League final for women / [Electronic resource] // All-Russian Volleyball Federation: [website].

*Comparative table of anthropometric data of players and team rosters*

| Role | Average height, cm | | Average age, years | | Player ratio, % | |
|---|---|---|---|---|---|---|
| | PetrSU | LCh | PetrSU | LCh | PetrSU | LCh |
| Blocking | 178,5 | 180,4 | 22 | 20 | 23,5 | 23,6 |
| Diagonal | 183,0 | 178,7 | 28 | 19 | 11,8 | 13,7 |
| Outside hitter | 176,8 | 176,1 | 23 | 20 | 23,5 | 30,7 |
| Libero | 167,0 | 167,3 | 22 | 19 | 17,7 | 14,4 |
| Connecting | 164,8 | 174,2 | 24 | 20 | 23,5 | 17,6 |

an athlete". The assessment consists of 9 scales: coping with unpleasant thoughts and emotions, activation and relaxation skills, involvement and "flow", visualization, self-efficacy, planning, activity under stress, relationships with the coach, demotivation.

The third stage of the study was the development of a method for interaction with the players by the coach-psychophysiologist in order to bring the players of the main team and the nearest replacement into optimal psychological shape by the start of the main competitions. At the same time, the technical and technical-tactical training coach worked taking into account the test results and analysis of the data from the second stage. The team psychologist begins his work with the use of psychodiagnostic methods that help to identify the athlete's strengths and weaknesses, as well as methods for identifying the current state during important training and competition stages. This is not just data collection – it is a map on which risk zones and growth points are marked. Individual and group work is built on the basis of diagnostics [1].

The psychologist's task is not to suppress inevitable conflicts, but to direct them in a constructive direction. For example, comparing a team with a sailboat: "If the rowers are synchronous, you are moving towards the goal even against the wind. If not, you spin in place, no matter how much effort you spend." The main trainings at this stage are: team building training to strengthen cohesion and trust in the team, communication training to improve interaction, conflict resolution training to be able to constructively resolve disagreements. It can be said that specialists working with the team must find a compromise between constant pressure and the requirement to get a result ("Faster! Higher! Stronger!") and maintaining a stable state without the effect of "not losing". Sports psychologist V. Sofronov formulated the solution to this problem very figuratively and succinctly: "The psychology of victory is formed by the psychology of the winner, and not vice versa."

**Conclusions.** The effectiveness of the joint work of the coach and psychologist with the team of candidates for master of sports was confirmed by the results of the university team's performance in the 2023-2024 and 2024-2025 game seasons, as well as a comparison of the results of the team's performance at competitions with similar training in the same region. The dynamics of the team's achievements over three seasons using the team's brigade method of training the team showed positive growth, which is a weighty argument in favor of the team's brigade work of specialists with the team. The developed technique makes it possible to achieve the goals set for the team, taking into account the needs and readiness of individual players both within one season and throughout the long-term training of the team.

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# Improving jump training based on body difficulty requirements in gymnastics

UDC 796.4

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**Abstract**

**Objective of this study** is to improve physical fitness indicators related to complex body elements in rhythmic gymnastics by applying a specialized set of exercises to develop jumping skills in gymnasts.

**Methods and structure of the study.** As part of the research methodology, an assessment of the current level of jumping training of the participants was carried out at the initial stage. At the second stage, a set of tools aimed at developing jumping abilities was integrated into the training program, including exercises with a rope with and without additional weight, as well as performing jumps that meet the requirements of the International Gymnastics Federation (FIG).

**Results and conclusions.** The results of the study showed that the use of the proposed set of exercises for the development of jumping training contributes to the formation of an improved functional state in gymnasts. This, in turn, leads to significant progress in terms of special endurance, speed, strength, and speed-strength characteristics necessary for successful rope jumping in accordance with the regulations of rhythmic gymnastics competitions.

***Keywords:*** *physical fitness, rhythmic gymnastics, jumping skills, set of exercises, training program, development of jumping abilities, functional state, special endurance, progress.*

**Introduction.** Non-objective training in rhythmic gymnastics is a process of improving the "Body Difficulties" included in the technical regulations of the International Gymnastics Federation FIG [5]. Body Difficulties are assessed by the D panel of judges based on the current score minus possible deductions [3]. One of the components of non-objective training is jumping training. A jump is the body's overcoming of space as a result of pushing off from the support. Structurally, jumps include the phases of preparation for the jump (run-up), push-off, flight (taking shape) and landing.

The basic characteristics for evaluating jumping elements are a certain and fixed flight shape, as well as a sufficient flight height.

Jumping elements can be performed with a push-off with one or two legs, with or without rotation, in a series or separately [4].

The determining physical qualities in the performance of jumping elements are the strength and speed of muscle contractions [1]. At the moment of push-off, the direction of efforts is of an overcoming nature. The precise coordination of strength, speed and rhythm of movements is of decisive importance.

Analysis of scientific literature and training activities of gymnasts shows that jump training of gymnasts is not systematic [2]. With a shortage of training time, specialists give preference to compositional training aimed at improving the competitive composition, without paying due attention to individual aspects of sports training. As a result, the limited technical training does not allow gymnasts to fully compete in competitions.

**Objective of the study** is to increase the level of non-objective training according to the regulations of Body Difficulties in rhythmic gymnastics by introducing a set of means of jump training of gymnasts.

**Methods and structure of the study.** The experiment, which lasted 4 months, involved 24 gymnasts performing in group exercises according to the program of candidates for master and master of sports.

At the first stage, pedagogical testing of the level of jump training of gymnasts was carried out. Test tasks included 4 exercises for the development of strength, speed-strength, speed qualities and special endur-

ance. At the second stage, a set of jumping training tools was introduced into the gymnasts' training process, including two exercise blocks.

Block 1 – jumping training tools with a rope using weights and without them:

- 5-10-minute running with a rope from one foot to the other or on both feet; no stops are allowed during the run; a catch is considered a mistake; when a catch is performed, 50 double jumps over the rope are added;

- combinations of jumping over the rope with acceleration for 20 seconds: jumping on two feet, jumping from one foot to the other, jumping with double rotation;

- double jumps with forward, backward, cross rotation of the rope; when performing double jumps with forward rotation of the rope, a minimum of 50 jumps are counted; the total number of other types of jumps with double rotation depends on the level of fitness of the gymnasts;

- jumping with a rope folded in half, with forward and backward rotation.

Block 2 - means of non-objective training, including "Body Difficulties" - jumps in accordance with the FIG technical regulations:

- combinations of small jumps used to prepare for the performance of "Body Difficulties" - jumps;

- jumping elements without bending the torso backward and turning in a step, touching, pushing off with one or two legs, different legs;

- jumping elements with bending the torso backward without turning: in a step, arching, touching, arching, pushing off with one or two legs, different legs;

- jumping elements with turning without bending the torso backward: jete en turnan, jete en turnan touching;

- jumping elements with turning and bending the torso backward: jete en turnan arching, jete en turnan touching;

- combinations of jumps in a circle in a row without stopping along the perimeter of the competition area.

The complex was used in the preparatory period of the annual cycle in the preparatory part of the training session with the tasks of increasing jump readiness, the level of development of special physical qualities and technical skill of gymnasts.

**Results and conclusions.** Upon completion of the study, a repeated test of the level of jump readiness of gymnasts was conducted. Significant differences were established at the significance level of $p<0.05$ (see table).

During the experiment it was revealed that under the influence of the complex of jump training means a new functional state of the gymnasts was achieved, which is expressed in the greatest increase in the indicators of special endurance in performing jumps with a step jeté en tournant in a circle from 10.7±0.22 to 15.9±0.20 times.

The increase in the energy cost of jumping loads stimulates the reserve capabilities of the speed-strength qualities of the gymnasts in performing jumps over a rope with double rotation from 26.1±0.57 to 31.4±0.28 times at $p<0.05$.

The transition to a new speed mode is due to the increase in speed qualities when performing jumps over a rope from foot to foot with acceleration from 18.1±0.33 to 21.3±0.19 times at $p<0.05$.

Synchronization of a certain and fixed flight form with a sufficient flight altitude ensured an improvement in the strength indicators in raising legs while hanging on a gymnastics wall from 7.1±0.48 to 11.3±0.29 times. The reliability of differences was determined at the significance level of $p<0.05$.

The developed set of jump training tools helped coaches choose their own concept of the training process and ensured a sustainable level of development of special physical qualities and technical skills of gymnasts.

**Conclusions.** The use of a set of jump training tools fills the competition composition with more complex jumping elements and ensures a sustainable increase in the level of athletic skill of gymnasts. The developed set of exercises allows you to effectively

*Dynamics of indicators of physical readiness of gymnasts*

| Indicator | To | After | P-value | |
|---|---|---|---|---|
| Hanging leg raises on a gymnastic wall, number of times | 7,1±0,48 | 11,3±0,29 | 3,03 | < 0,05 |
| Jumping rope with double rotation, number of times | 26,1±0,57 | 31,4±0,28 | 6,00 | < 0,05 |
| Jumping rope from foot to foot with acceleration, number of times | 18,1±0,33 | 21,3±0,19 | 5,16 | < 0,05 |
| Jumps with a step jeté en tournant in a circle, number of times | 10,7±0,22 | 15,9±0,20 | 6,10 | < 0,05 |

solve the problems of athletic training of gymnasts and make timely adjustments to the training process.

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# The effect of age on sprinting performance during acceleration in long jump athletes

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**Abstract**

**Objective of the study** is to study the peculiarities of the influence of the age factor on the manifestation of speed and strength qualities in the run–up phase of long jumpers.

**Methods and structure of the study.** The study involved 35 young athletes specializing in the long jump. The participants were divided into two age categories: the first group included athletes aged 15.5±0.6 years, and the second – 18.4±0.6 years. Using regression analysis methods, a measure of the influence (determination) of various factors on the result of the long jump was established. The indicators characterizing speed and strength qualities, flexibility, general and explosive strength, as well as the speed of sprinting were considered as predictors.

**Results and conclusions.** Over the years, the importance of sprint speed for the successful long jump has increased, due to a complex of biological changes. Predicting the results of long jumps for athletes of different age groups becomes more accurate when using tests that measure the explosive strength of the muscles of the lower body.

***Keywords:*** *long jump, explosive force, run-up phase, repulsion, influence of age factor, jump efficiency.*

**Introduction.** Jumps are complex motor actions consisting of a run-up phase (cyclic movement), push-off phases, flight and landing (acyclic actions). The oldest jumping discipline in track and field is the long jump.

Scientific research has confirmed that a significant factor in achieving high results in long jumpers is the level of development of speed-strength qualities [4]. In highly qualified jumpers, the percentage of influence of speed qualities on the sports result is 89.5%, in jumpers of mass sports categories – 84.9% [5]. Among the special physical qualities of a long jumper, explosive strength is of the greatest importance.

The effectiveness of the jump is ensured by achieving the maximum run-up speed at the moment of push-off, which allows transforming the inertia of the run into the maximum push-off force. In highly skilled athletes, the running speed at the moment of placing the push-off leg on the take-off bar is 90-95% of the maximum sprint speed and reaches a level of 10.50 m/s to 11.23 m/s [5].

Using highly skilled long jumpers as an example, it was found that a higher level of maximum run-up speed is associated with a higher running speed one meter before the take-off [1].

The maximum speed that long jumpers strive to develop during the run-up is significantly inferior to the maximum speed of a sprinter [3]. Jumpers of mass sports categories show an insufficient level of development of speed qualities during the run-up. Therefore, training for their development contributes to the formation of athletic skills in a long jumper.

**Objective of the study** is to study the features of the influence of the age factor on the manifestation of speed-strength qualities in the run-up phase of long jumpers.

**Methodology and organization of the study.** The sample of subjects of the study consisted of 35 young male long jumpers, who, depending on age, were divided into two subgroups: 15.5±0.6 years (height: 171.0±7.83 cm, body weight: 57.8±5.3 kg);

18.4±0.6 years (height: 184.4±6.6 cm, body weight: 77.4±3.2 kg). The dependence of the results in long jump on the age factor was studied at the beginning, during and at the end of the age period of development. The subjects performed the following tests: long jump, medicine ball throw from a sitting position, medicine ball throw from a lying position, medicine ball throw backwards over the head, standing long jump, standing triple jump, standing high jump, shoulder twisting with a stick, forward bend while standing on a bench, splits, 20 and 30 m running.

The subjects performed each test twice with a pause of at least 3 minutes between repetitions. The best result of two attempts was counted.

Statistical analysis was performed using the SPSS version 21.0 package based on regression analysis. Statistical significance was determined at the level of $p<0.05$.

**Research results and their discussion.** According to the analysis of biomechanical characteristics, the long jump belongs to the group of complex spatial movements, and according to the type of motor activity – to natural movements without the use of technical devices. Of all the mechanical factors, the greatest influence on the level of results in long jumps is exerted by the run-up speed, the magnitude of the take-off impulse and the take-off angle [2].

A statistically significant influence of the age factor on the results of performances in long jumps was established; for 15-year-old athletes – at the level of 40.4%, for 18-year-old jumpers – at the level of 51.5% of the total variability. For 15-year-old boys, a statistically significant relationship between individual indicators was established in the tests – standing high jump, standing triple jump and forward bend while standing on a bench; for 18-year-old athletes, statistically significant values of the regression coefficients were found in the tests – standing high jump, 20 m run, throwing a medicine ball backward over the head, throwing a medicine ball from a sitting position, 30 m run and throwing a medicine ball from a lying position (Tables 1, 2).

The study found that a high level of speed abilities is a significant factor influencing the athletic performance of the long jump. With age, the positive effect of sprint speed increases, which can be explained by many factors that influence the indicators of speed abilities during biological development. During student age, when the full formation of basic motor abilities ends, the quality of the long jump is largely determined by the individual functional capabilities of the athlete.

A higher maximum run-up speed contributed to the generation of greater repulsion force and acted as an indicator of a higher explosive strength potential of the subjects.

With increasing age of the athlete, the number of exercises that have a statistically significant effect on the result of the long jump increases due to greater isolation of motor abilities and physical qualities. This means that they all act as independent factors influencing motor structures of varying complexity. With the expansion of the motor potential in the process of human biological development and sports training, the specificity of the manifestation of physical qualities significantly increases the number of factors determining the athletic result.

**Conclusions.** Based on the data obtained, it can be concluded that the basis of the special physical qualities of a long jumper is primarily the explosive

Table 1. Statistics of multiple regression analysis in a group of 15-year-old long jumpers

| Indicator | R | R- square | β | betainc (p) | betainc (q) |
|---|---|---|---|---|---|
| Seated Medicine Ball Throw | 0,42 | 0,06 | 0,01 | 0,45 | 0,93 |
| Medicine Ball Throw from Prone Position | 0,34 | -0,12 | -0,17 | 4,87 | 0,22 |
| Medicine Ball Backward Overhead Throw | 0,51 | 0,13 | 0,16 | 7,95 | 0,19 |
| Long jump from a standing position | 0,60 | -0,8 | -0,12 | 7,54 | 0,36 |
| Triple jump from the spot | 0,64 | 0,21 | 0,24 | 12,57 | 0,04 |
| Standing high jump | 0,63 | 0,36 | 0,45 | 22,09 | 0,06 |
| Shoulder rolls with a stick | -0,7 | -0,4 | -0,3 | 0,21 | 0,59 |
| Standing Forward Bend on a Bench | 0,33 | 0,21 | 0,15 | 4,43 | 0,02 |
| Sit in the splits | 0,35 | 0,11 | 0,15 | 3,85 | 0,16 |
| 20m dash | -0,53 | -0,12 | -0,12 | 6,23 | 0,21 |
| 30m dash | -0,43 | -0,09 | -0,09 | 4,32 | 0,29 |

*Table 2. Multiple regression analysis results in a group of 18-year-old long jumpers*

| Indicator | R | R- square | β | betainc (p) | betainc (q) |
|---|---|---|---|---|---|
| Seated Medicine Ball Throw | 0,26 | -0,16 | -0,25 | 6,39 | 0,03 |
| Medicine Ball Throw from Prone Position | 0,38 | 0,15 | 0,26 | 7,76 | 0,04 |
| Medicine Ball Backward Overhead Throw | 0,45 | 0,24 | 0,22 | 8,26 | 0,02 |
| Long jump from a standing position | 0,49 | -0,07 | -0,05 | 2,73 | 0,58 |
| Triple jump from the spot | 0,55 | 0,13 | 0,15 | 7,62 | 0,04 |
| Standing high jump | 0,57 | 0,32 | 0,37 | 21,76 | 0,01 |
| Shoulder rolls with a stick | -0,26 | -0,22 | -0,05 | 0,01 | 0,09 |
| Standing Forward Bend on a Bench | 0,26 | 0,13 | 0,11 | 2,62 | 0,14 |
| Sit in the splits | 0,17 | 0,09 | 0,05 | 0,73 | 0,42 |
| 20m dash | -0,35 | -0,22 | -0,24 | 7,42 | 0,12 |
| 30m dash | -0,41 | -0,15 | -0,14 | 5,43 | 0,08 |

power of the lower limbs of the horizontal and vertical type. The length of the jump directly depends on the running speed before the push-off phase, which allows us to build a predictive model of the run-up speed. Effective prediction of the results of long jump performance by athletes of different ages is possible based on the results of tests to assess the explosive power of the lower limbs.

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# Characteristics of the semantic content of the concept of "game giftedness" (using the example of football)

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**Abstract**

**Objective of the study** to scientifically substantiate the essence and content of the concept of “gaming talent” in sports activities.

**Methods and structure of the study.** To achieve the goal, a study was conducted using the following methods: analysis of scientific and methodological literature (using the ResearchGate, Google Scholar and PubMed databases).

**Results and conclusions.** Gaming talent is an original systemically developing model of readiness for gaming activity, expressed in the totality and qualitative uniqueness of innate physical (speed of action), psychophysiological (perception, sensorimotor reactions, gaming intelligence) and acquired social (propensity for gaming interaction, emotional and social intelligence) qualities, which make it possible to compensate for the insufficiency of some functional qualities due to the priority of the evolution of others.

The content of gaming talent consists of physical, psychophysiological and social qualities.

***Keywords:*** *gaming talent, sports talent, football, game sports.*

**Introduction.** The continuous growth of achievements in sports, and in sports games in particular, places ever greater demands on the system of training athletes, in which the search for gifted people occupies a significant place. Therefore, among those wishing to engage in sports, it is necessary to improve the quality of selection and search for the most talented and promising children who can show outstanding sports results [4].

The problem of sports selection and its component – diagnostics of sports talent are one of the central ones in the field of theory and methodology of sports training and are associated with a wide range of issues addressed by sports science and practice. However, no less important in solving this issue is the creation of the necessary favorable conditions of an organizational nature, allowing an objective assessment of the individual abilities and capabilities of a young candidate for the chosen sport [5].

**Objective of the study** to scientifically substantiate the essence and content of the concept of “gaming talent” in sports activities.

**Methods and structure of the study.** To achieve the goal, a study was conducted using the following methods: analysis of scientific and methodological literature (using ResearchGate, Google Scholar and PubMed databases). The search for studies was conducted online in open electronic journal databases using the keywords: “talent”, football, selectioninfootball, selectioncriteria.

**Results and conclusions.** Sports (motor) talent is understood by both domestic and foreign scientists as a combination of psychophysical qualities and properties of the body and personal qualities that ensure high achievements in any kind of sport.

We believe that it is appropriate to consider sports talent taking into account the specific requirements of the sport.

There are various approaches to classifying sports. In our work, we rely on the classification by the features of the organization of the athlete’s movements and the predominant role of certain functional sys-

tems of the body in ensuring their working effect (V.S. Farfel, 1969; Yu.V. Verkhoshansky, 1985). These authors identified three groups of sports:

Group I: acyclic sports, the predominant role in which belongs to the improvement of the motor apparatus in the direction of fine regulation of movements and the ability to perform high-power working efforts (weightlifting, track and field throws, etc.).

Group II: cyclic (mainly submaximal and moderate power) sports, achievements in which are oxygen supply for muscle work (middle and long distance running in track and field, etc.).

Group III: combined sports (complex), which are characterized by high variability of motor actions under conditions of compensated fatigue and variable intensity of work; these include sports games and martial arts.

Game sports have a number of distinctive features that allow us to talk about the specifics of selecting children to practice this category of sports. In our work, we analyzed the features of game sports such as basketball, handball, hockey and football in order to determine the leading, significant qualities and abilities for practicing game sports.

Football is one of the most popular sports in the world, it has unique characteristics that distinguish it from other sports games [6].

Firstly, it is necessary to note the structure of the game itself, as football is a game in which two teams of 11 players participate, which exceeds all other sports in the number of athletes in a team, which predetermines more complex tactical schemes and tasks in the game. Also, the football field has dimensions of up to 100-110 meters in length and 64-75 meters in width, which creates many opportunities for tactics and strategy of the game.

Secondly, one of the key distinguishing features of football is the use of the feet, as unlike other team sports, the ball is not allowed to be held or thrown with the hands (except by goalkeepers in their own penalty area or when throwing the ball from the sideline), which creates a unique dynamic of movement in which players use their feet to control the ball.

Neurophysiology in performing actions with hands and feet is determined by the specific transmission of nerve impulses in the legs and arms, which have differences associated with anatomical features and functional needs. Legs have a greater length of nerve fibers that transmit impulses to the muscles and receptors of the legs, while hands, on the contrary, have more complex fine motor skills, which requires greater control from the brain and a more subtle transmission of impulses.

The legs are anatomically represented in the cerebral cortex less than the arms, which is associated with the smaller number and larger muscles of the lower limbs [2].

Thus, the lower limbs are a means of movement, but are significantly inferior to the hands in terms of ergonomics of performing actions with the ball, making football, in our opinion, more complex and specific than other sports games. A football player has a greater number of thought and analytical processes in the brain to solve problems of turning on and controlling the lower limbs in a specific game situation [3].

Thirdly, the tactical aspect of football also deserves attention, since, unlike sports such as basketball or volleyball, which are characterized by a fast change of score and a large number of points, football usually has a low level of scoring, which places great demands on the variability of tactical schemes, which can include various formations, pressing, counter-attacking strategies and adaptive strategies focused on the strengths and weaknesses of the opponent.

G.L. Drandrov defines the team's game activity as: "as a coordinated mental and visible activity of team members aimed at achieving victory over an opponent in the conditions of a specific confrontation and in compliance with established rules. Depending on the game situation, the existing feature that leads to a ball strike, two types of game activity can be found – protection and defense" [1].

Fourthly, football has its own psychological characteristics, since games can last 90 minutes with added time, players are often subjected to high psychological stress, which requires them to be able to control their emotions in critical situations over a long period of time.

Thus, football stands out among other sports games due to its unique structure and rules, foot play, tactical complexity and enormous psychological load, which allows football to be a real cultural phenomenon that unites people all over the world.

Summarizing the results of the analysis of the specifics of activity in team sports, we can conclude that it includes many aspects that affect the effectiveness of the process of sports selection and orientation, the content of the training process and the specifics of participation in competitions. Unlike individual game sports, team game sports require a high degree of

cooperation, tactics and dynamics, since the most significant element of the game is team interactions, where success depends not only on the individual skill of each athlete, but also on the coherence of the actions of all team members.

One of the key characteristics of team sports is the presence of clearly defined tactical schemes and strategies that form the context of the game, in which players must not only know these schemes well, but also be able to adapt to constantly changing conditions on the playing field, which requires high flexibility of thinking, the ability to quickly and accurately assess the game situation, the ability to anticipation, i.e. predicting the actions of the opponent, the ability to read the game and react to game situations in real time.

The psychological demands on the player also distinguish team sports, as athletes are required to be psychologically resilient because players face pressure, stress and competitive emotions that can affect results, and the ability to remain calm in critical moments, maintaining team spirit and a positive moral and volitional atmosphere in the team is crucial to achieving success.

Team sports place high demands on the physical fitness of players – high endurance, strength, speed and coordination, which makes physical training complex and multi-level. Training usually focuses on both the development of individual physical qualities and joint exercises that help strengthen teamwork [7].

The general distinctive features of game activities in team sports are:

1. Speed of action, since representatives of sports games have a significant advantage in the speed of thinking (decision-making) compared to representatives of many other sports;

2. Perception (visual and specialized) – the characteristics of visual perception, especially depth vision (eye) and volume of vision (peripheral vision), are of particular importance. Specialized perceptions include “ball sense”, “goal sense”, “court sense”;

3. Sensorimotor reactions, characteristic of game activity are reactions with choice and reactions to a moving object, repeated starting accelerations with a change of direction for the ball, for an opponent, replacing some techniques and actions with others.

4. Game intelligence – the ability to quickly and effectively analyze a game situation, make quick, informed decisions, and anticipate the opponent’s actions (anticipation). Game intelligence includes the following aspects: intuitive understanding of the game, awareness of positions, skills, and analysis of the basic principles of strategy and tactics, the ability to assess the risks and potential of various game actions, the ability to anticipate the opponent’s moves, proactively respond to changes during the game, and successfully interact with teammates;

5. Predisposition to game interaction (inclination). The ability to interact in game activities.

The analysis of the interpretations of the concepts of “giftedness”, “sports giftedness”, as well as the study of the specifics of team sports, allows us to conduct a semantic analysis of the considered definitions of the concept of “sports giftedness”, and using the tool for creating a “word cloud”, to highlight and visually present the key lexical units characterizing the semantic content and terminological base of the phenomenon under study.


*Figure 1. “Word cloud” characterizing the semantic content of the concept “sports talent” (resource https://wordscloud.pythonanywhere.com/ was used)*

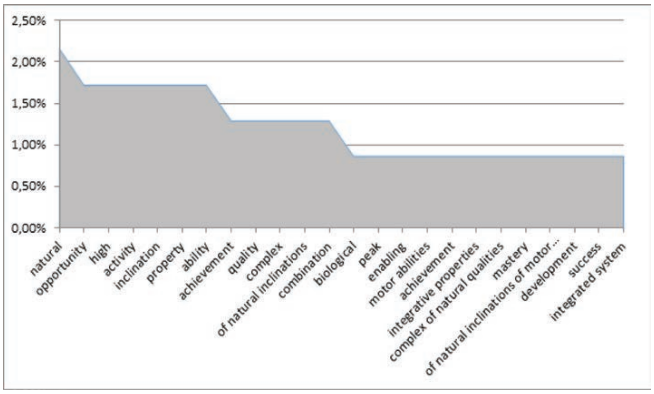


*Figure 2. Distribution of key lexical units by frequency of their use in the text describing the concept of “sports talent” (semantic analysis was carried out using the resource advego.com)*

Interpreting the results of semantic analysis and the construction of a "word cloud", we can conclude that athletic talent reflects the natural qualities, capabilities, and abilities of a person that make it possible to achieve results in sports activities. In our opinion, in team sports it is appropriate to talk about the presence of gaming talent as a specific type of athletic talent.

Based on the analysis of scientific research by specialists in team sports, we have identified the main aspects of the manifestation of "gaming talent" directly in gaming activities on the field (Figure 3).


*Figure 3. Manifestations of football players' playing talent in the game*

Thus, giftedness in the game is not demonstrated by the number of kilometers covered or the power of the shot, but by the ability to see what others do not see, to anticipate the development of events several moves ahead and instantly make and execute the optimal decision, changing the course of the match with one pass, shift or interception.

The content of gaming talent consists of physical, psychophysiological and social qualities.

First of all, the assessment and prediction of the development of physical abilities plays a significant role in gaming activities.

Psychophysiological qualities are critically important, including motivation, self-confidence, concentration and stress resistance. Athletes must be able to manage their emotions, especially in stressful situations, which directly affects their results.

Social skills and teamwork are no less important. Teamwork, communication skills and emotional intelligence help athletes interact effectively with teammates and coaches.

**Conclusion.** Thus, summarizing the results of the study, we can conclude that gaming talent is an original systemically developing model of readiness for gaming activity, expressed in the totality and qualitative uniqueness of innate physical (speed of action), psychophysiological (perception, sensorimotor reactions, gaming intelligence) and acquired social (propensity for gaming interaction, emotional and social intelligence) qualities, allowing to compensate for the insufficiency of some functional qualities due to the priority of the evolution of others.

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# Heart rate variability and autonomic activity in young short-track athletes at the age of 14

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**Abstract**

**Objective of the study** was to determine the features of heart rate regulation and autonomic regulation for an orthostatic test in 14–year-old short-track athletes in the pre-competition training period.

**Methods and structure of the study.** The study involved 22 young male short-track athletes, with an average age of 14 years. The experiment was conducted at the stage of preparation for the competition. Temporal (MxDMn, RMSSD, SI) and spectral (TP, HF, LF, VLF) parameters were recorded using the Varicard 2.51 complex and ISCIM-6 software. Further processing and study of the obtained data were carried out using mathematical statistics methods.

**Results and conclusions.** For fourteen-year-old short-track athletes, the average values of temporal and spectral parameters in the clinostasis position significantly exceed the standard values typical for their peers who do not engage in sports. These values are also significantly higher than those of young athletes of the same age who specialize in other disciplines. The analysis of vegetative reactivity using an orthostatic test showed the presence of an overactive reaction of the body to a change in body position.

***Keywords:*** *heart rate regulation, autonomic reactivity, clinostasis, orthostasis, physical activity, short track, adolescents, adequate physical activity.*

**Introduction.** In adolescence, systematic training loads are superimposed on the ontogenetic processes of growth and development and, if their volume and intensity do not correspond to the adaptive capabilities of the body, cause tension in the regulatory systems. Work at the limit of functional capabilities often leads to a breakdown of regulation towards decompensation. On the contrary, adequate physical activity increases functional reserves, reduces the tension of regulatory mechanisms, and maintains homeostasis [8].

Structural and functional changes in the heart under the influence of physical activity, as a rule, are of a physiological nature, but often carry signs of maladaptation, a violation of regulatory mechanisms. Overstrain of adaptation mechanisms in youth sports leads to the development of various pathological conditions in the cardiovascular system, not excluding fatal outcomes [10].

In the line of methods for studying the adaptation of the cardiovascular system to training physical activity, the most important place is occupied by variational pulsometry and its mathematical analysis using the method of R.M. Baevsky [1]. The combination of this method with an active orthostatic test allows us to identify the level of autonomic reactivity and detect potential signs of heart rate regulation disorders at an early stage [3, 8]. The severity of adaptive changes depends on the volume and intensity of physical activity, so the analysis of heart rate regulation mechanisms should be carried out taking into account the intensity of physical activity [9].

**Objective of the study** was to identify the features of heart rate regulation and autonomic regulation in response to an orthostatic test in 14-year-old short track athletes during the pre-competition training period.

**Methods and structure of the study.** Dynamic studies of HRV were conducted in 22 male short track athletes aged 14 during the pre-competition training period using the Varicard 2.51 device and the ISCIM-6 program.

The following HRV parameters were calculated: the index of the variation range of cardiointervals R-RMxDMn (ms), the index of the stress index (SI, conventional units), the RMSSD index (ms), the total spectrum power (TP, ms), the spectrum power of high-frequency (HF, ms), low-frequency (LF, ms), and very low-frequency (VLF, ms). The recording duration in clinostasis was 5 minutes. To assess the level of vegetative reactivity and identify the reserve capacity of the body, an orthostatic test was carried out for 5 minutes. In order to identify the adaptive potential of the body of short track athletes, a short-term intense load lasting 45 seconds was carried out at the maximum pace for the subject.

Statistical data processing was carried out using the method of variation statistics using Student's t-test. The Biostat software package was used. Average values (M) and the error of the mean (m) were calculated. The critical significance level for testing statistical hypotheses in this study was taken to be $p<0.05$.

**Results and conclusions.** An analysis of heart rate variability (HRV) indices was conducted in 14-year-old male adolescents involved in short track in the pre-competition period (Table 1).

In the supine position, the predominance of the autonomous regulation circuit (type III) was revealed according to the classification of N.I. Shlyk [8], which, according to a number of authors [3,8], reflects a high level of functional state and should be considered as the potential ability of the body to effectively adapt to competitive physical activity [2]. Under the influence of systematic physical activity in adolescence (13-14 years), there is a change in the lability of the sinus node and the formation of more advanced forms of neurohumoral regulation of the heart due to an increase in the tone of the vagal link of the autonomic nervous system [5]. It should be noted that in some subjects, the HRV indicators are close in magnitude to type IV regulation with a pronounced dominance of the autonomous regulation circuit. In the works [8], the appearance of type IV indicates the state of athletic "form", which occurs during the competitive period. However, in the indicated works, the HRV indicators were obtained in adult athletes of the highest skill level. The obtained data exceed the age standards for athletes of this age group and the corresponding type of vegetative regulation.

According to our results, in short track athletes in the prone position, the time values of the MxDMn, RMSSD and SI indicators are 474±35.36 ms, 143±12.54 ms and 50±4.92 conventional units, spectral TP, HF, LF, VLF: 18293±2752 ms, 13135±1915 ms, 3582±688 ms and 1086±385 ms, respectively. At the same time, in the work of Shlyk N.I. [8] In 14-year-old athletes with type III regulation, the HRV indices are significantly lower and equal to: 345±13.7 ms, 78±5.5 ms, 49±4.8 ms for MxDMn, RMSSD, SI and 4553±352 ms, 2542±348 ms, 1124±118 ms, 382±73 ms for TR, HF, LF, VLF, respectively. In addition, the HRV indices we obtained in 14-year-old short track speed skaters are significantly higher compared to the indices in young volleyball players [2], 14-year-old sambo wrestlers [6], 15-year-old skiers [8], 15-year-old rowers [7]. Without excluding the situation in which the level of the functional state of young short track athletes is really high, we conducted an additional individual analysis of the indicators, which allows us to identify the probability of a pre-nosological condition. The results showed that in individual subjects, the value of the HRV indicators in clinostasis and during the transition to orthostasis indicates the presence of the IV pathological type of vegetative regulation. Thus, in athlete B-v, the TR indicator is 21166 ms, HF – 13135 ms, RMSSD – 161 ms, MxDMn – 521 ms, which indicates a violation of the heart rhythm [8]. The authors associate the spread of MxDMn values \u200b\u200bbeyond 530 ms with a shift in the pacemaker or the development of grade I SA block. During the transition to orthostasis, subject B-ko recorded a twofold increase in the MxDMn indicator, which corresponds to the pathological phenomenon of bradycardia.

According to the concept of R. M. Baevsky [1], the functional reserve is defined as the ability to adapt to

*Table 1. Heart rate variability indices in clinostasis and orthostasis in short track athletes (M±m)*

| Stage, at rest | Heart rate variability indices | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Heart rate, beats, min. | MxDMn, ms | RMSSD, ms | SI, conv. units | TP, ms | HF, ms | LF, ms | VLF, ms |
| Clinostasis | 69± 4,28 | 474± 35,36 | 143± 12,54 | 50± 4,92 | 18293± 2752 | 13135± 1915 | 3582± 688 | 1386± 315 |
| Orthostasis | 118± 8,80 | 403± 29,02 | 107± 9,33 | 65± 5,21 | 8754± 1309 | 6034± 1156 | 2373± 604 | 589± 104 |
| P | p<0,05 | p>0,05 | p<0,05 | p<0,05 | p<0,05 | p<0,05 | p>0,05 | p<0,05 |

*Table 2. Heart rate variability indices in clinostasis and orthostasis after anaerobic load (M±m)*

| Stage, after FN 45 seconds | Heart rate variability indices | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Heart rate, beats, min. | MxDMn, ms | RMSSD, ms | SI, conv. units | TP, ms | HF, ms | LF, ms | VLF, ms |
| Clinostasis | 72±5,29 | 532±38,02 | 174±17,61 | 49±5,66 | 23644± 3875 | 18043± 2538 | 5586± 1164 | 1222± 469 |
| Orthostasis | 108±7,51 | 287±24,50 | 99±7,82 | 167±14,53 | 7298± 1062 | 5023± 1203 | 1557± 780 | 373± 195 |
| P | p<0,05 | p<0,05 | p<0,05 | p<0,05 | p<0,05 | p<0,05 | p<0,05 | p<0,05 |

*Note: FN – physical activity.*

the effects of external conditions without disrupting homeostasis and disrupting the regulatory mechanisms. One of the informative tests for identifying hidden reserves of the cardiovascular system of the body is the orthostatic test [1, 2, 4]. If the regulatory mechanisms do not have sufficient functional potential, the transition to orthostasis is a stressful effect to which the body reacts with hyperreactivity, or a paradoxical reaction [8]. After performing the orthostatic test, an increase in tension in the regulatory systems was detected, which manifested itself as hyperreactivity with a decrease in the TR indicator by 109%, HF – by 118% and VLF – by 135%.

The obtained results of the active orthostatic test confirm the assumption about the unfavorable state of the functional-adaptive reserves of the heart in young short track athletes aged 14 years. The dynamics of the HRV indices during the test physical load testifies to the decrease of the adaptation reserves. Taking into account the peculiarities of the sport in our work, the young athletes performed anaerobic glycolytic work lasting 45 seconds (Table 2).

The analysis of the HRV results showed that after muscular work the transition to orthostasis is accompanied by a sudden increase in the autonomic reactivity of sympathetic genesis, which is expressed in a 3.4-fold increase ($p<0.05$) in the stress index (SI) with simultaneous suppression of vagal reactivity with a decrease in the TR index by 3.2 times ($p<0.05$), HF and LF by 3.6 times ($p<0.05$), VLF by 3.3 times ($p<0.05$) (Table 2).

In some athletes, during the transition to orthostasis, reactivity proceeded according to a paradoxical type, while instead of decreasing, the indicator increased (MxDMn, RMSSD, HF, TP) and, conversely, instead of increasing, a decrease was recorded (SI).

**Conclusions.** HRV analysis allows us to assess the state of the autonomic regulation of the heart rate. In young 14-year-old short track athletes, a moderate dominance of the autonomous regulation mechanism was revealed in the pre-competition period.

The indicators of load orthostatic testing revealed different levels of autonomic reactivity from moderate to hyperreactive and paradoxical, which is associated with different levels of functional fitness of young short track athletes.

Using HRV analysis, it is possible to monitor the functional state of the cardiovascular system of young athletes involved in short track at various stages of the training process.

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# Prolonged adaptability of highly qualified athletes to training stresses, studied by longitudinal metabolomic analysis of biofluids

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**Abstract**

**Objective of the study** is to determine the feasibility of longitudinal metabolome analysis of biological samples from elite athletes to identify previously unknown and highly sensitive metabolic processes associated with long-term adaptation to intense training.

**Methods and structure of the study.** To identify metabolic pathways associated with long-term adaptation to training in elite athletes, a computerized search and analysis of relevant scientific publications describing the capabilities of longitudinal metabolomic analysis of biological samples was performed. The search was conducted in the electronic scientific citation databases PubMed, Scopus and Web of Science to identify relevant studies.

**Results and conclusions.** Careful planning of the pre-analytical phase (including selection of study participants, definition of the analyzed sample, choice of methodology and approach to profiling) is the key to successful longitudinal metabolomic analysis of biological fluids in professional athletes involved in a long-term training cycle. Using such opportunities allows identifying significant shifts in the functioning of the physiological systems of the body of the trainee (endocrine, cardiovascular, oxygen transport system, energy metabolism at the cellular level), which are reflected in the metabolomic profile of the studied biological fluid.

Systematic multi-month training forms a specific phenotype of a highly qualified athlete, determined by his individual ability to adapt and having a unique metabolomic expression. Longitudinal metabolomic analysis of biological fluids provides information necessary for an in-depth study of the mechanisms of long-term adaptive changes occurring in the body of professional athletes.

***Keywords:*** *training loads, long-term adaptation, metabolic profiling, functional state, qualified athletes, mechanisms of adaptation processes.*

**Introduction.** Physical activity, as an external stimulus, leads to an immediate response of the body to its impact. In turn, metabolites, being substrates and end products of cellular metabolism, directly reflect the cellular activity of the body, and their concentrations react to minor disturbances in cellular homeostasis caused by physical activity [4, 1]. Sports metabolomics, as an "omics" direction of sports biochemistry, evaluates and studies changes in the content of low-molecular compounds (up to 1.5 kDa) in biological fluids of athletes under the influence of physical activity in order to identify metabolic pathways and biomarkers associated with changes in the functional state of the athlete's body [2]. Today, the following tasks are successfully solved based on the metabolomic approach [10,14,5]:

– identification of biomarkers characterizing the level of general fitness of an athlete and allowing to evaluate the effectiveness of training programs and the quality of recovery processes;

– identification of biomarkers that allow reliable identification of the discrepancy between training loads and the functional capabilities of an athlete and to detect the risk of overtraining at early stages.

However, despite the large number of works aimed at solving the above problems, only a few of them are devoted to the use of longitudinal metabolomic pro-

filing of biological fluids (hereinafter referred to as LMPB) of qualified athletes to identify new metabolic pathways that are highly sensitive to functional shifts and associated with long-term adaptation to training loads.

**Objective of the study** is to identify the potential of longitudinal metabolomic profiling of biological fluids of qualified athletes to identify new metabolic pathways that are highly sensitive to functional shifts and associated with long-term adaptation to training loads.

**Methods and structure of the study.** A computerized search for relevant articles reflecting the results of studies on the LMPB of qualified athletes was conducted using the electronic scientific citation databases PubMed, Scopus and Web of Science. The search time frame was five years (from January 2020 to January 2025). Only works with an experiment duration of at least 12 weeks were considered.

Results and conclusions. As a result of a computerized search for the keywords "metabolomics and sports", 858 articles were found. Works with an experiment duration of less than 12 weeks were excluded for further consideration. Only scientific materials in which qualified athletes participated (at least five years of experience) were analyzed. Thus, nine articles met the criteria we established. Table 1 presents data on the analyzed objects, the methods used and the strategies of metabolomic profiling in these works.

Most studies used single stress testing or short periods of training exposure. Table 1 shows the lack of uniformity in the choice of objects to be analyzed when conducting the LMPBZh of qualified athletes. In the studies [8, 6, 15, 9], despite the invasiveness of the biomaterial selection procedure, the object of metabolomic profiling was blood, since it contains all the molecules secreted or excreted by the body's tissues. In the studies [13, 12, 11, 3], urine was chosen as the object of study due to the non-invasive method of collection and low requirements for sample storage, however, the high bacterial content in combination with the elevated transportation temperature can lead to a noticeable distortion of its composition.

Only in two studies [7, 9] saliva was used as the LMPBZh object of study. Despite the non-invasiveness of the selection procedure and the wide spectrum of low-molecular metabolites present in saliva, the main disadvantage of this research object is the ultra-low content of metabolites (several picograms per milliliter). In this context, the choice of the object under study is of fundamental importance when conducting LMPBS. When choosing a profiling method, there is a virtually uniform view on its implementation.

Eight studies [8, 13, 12, 11, 6, 3, 15, 9] used liquid chromatography-mass spectrometry with electrospray ionization (HPLC-MS), which allows identifying thermolabile and polar molecules of metabolites present in ultra-small quantities in complex biological matrices. The use of gas chromatography-mass spectrometry (GC-MS) for metabolomic profiling [7, 9] is advisable due to the possibility of identifying

*Table 1. Research objects, methods and strategies of metabolomic profiling in the selected scientific publications*

| Sport / Group | Object | Period | Method | Strategy | Authors |
|---|---|---|---|---|---|
| Weightlifting (12 men), middle, long and marathon distance running (10 men), control group (12 men) | blood | 1 year | HPLC-MS/MS | target | [8] |
| Football (41 men) | urine | 10 months | HPLC-MS/MS | non-targeted | [13] |
| Basketball (10 men, 10 women), control groups (10 men, 10 women) | saliva | 12 weeks | GC-MS | target | [7] |
| Football (23 men, 28 women) | urine | 11 months | HPLC-MS/MS | target | [12] |
| Football (134 men) | urine | 11 months | HPLC-MS/MS | non-targeted | [11] |
| Football (42 men) | blood | 6 months | HPLC-MS/MS | target | [6] |
| Football (24 women) | urine | 2 years | HPLC-MS/MS | target | [3] |
| American Football (23 men) | blood | 9 months | HPLC-MS/MS | non-targeted | [15] |
| Basketball (10 men, 10 women), control group (10 men, 10 women) | blood, saliva | 12 weeks | GC-MS, HPLC-MS/MS | target | [9] |

metabolites using libraries containing mass spectra of several hundred thousand compounds and the absence of matrix effects. However, the need for an additional derivatization stage at the sample preparation stage complicates large-scale studies using this method. In studies [8, 13, 11, 15], scientists used a non-targeted strategy of metabolomic profiling. It is important to note the transition from the non-targeted [13, 11] to the targeted strategy [12, 3] of the Rodas group, confirming the need for verification and validation of the identified markers after using the non-targeted strategy.

The principle of the latter is to conduct a "panoramic" metabolomic study aimed at detecting, identifying and semi-quantitatively determining the maximum number of metabolites in biological samples without a pre-formulated biological hypothesis. The target strategy is used to identify and quantify metabolites associated with the biological processes/pathways under study that characterize the biological function of interest. Multivariate statistics methods were used to process the obtained data in all studies.

Regular performance of specific and high-intensity, high-volume loads over several years leads to the regulation of mitochondrial energy metabolism, amino acid metabolism, fatty acid oxidation, and cellular signaling [8]. A “metabolic trace” associated with the metabolism of tryptophan, purine, phenylalanine, tyrosine, a number of steroid hormones, histidine, methionine, and cysteine has been identified [13, 12, 11, 3]. Increased regulation of glutathione metabolism in basketball players has been revealed for the first time, indicating a significant role of antioxidant protection in the long-term adaptation of athletes in team sports to training loads [7, 9].

Attention to preanalytical aspects (formation of a group of subjects, the analyzed object, the choice of the method and profiling strategy) determines the capabilities of the LMPBZh of qualified athletes participating in a multi-month training process. The implementation of these capabilities affects the potential for detecting significant changes in the functioning of the body systems (endocrine, cardiovascular, oxygen transport, energy supply of intracellular metabolism) of a qualified athlete, reflected in the metabolomic profile of the analyzed biological fluid.

Conclusions. Regular training for several months leads to the development of a characteristic phenotype of a qualified athlete in accordance with his adaptation potential, which has an individual "metabolomic trace". LMPBZh provides an opportunity to obtain data necessary for a deep understanding of the mechanisms of long-term adaptation processes occurring in the athlete's body. Funding

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# The conceptual scheme of teaching students of pedagogical universities for the implementation of cultural and educational work: the specifics of the «physical education» field

UDC 378.147

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**Abstract**

**Objective of the study** is aimed at developing and theoretically substantiating a structural and functional model that ensures the readiness of future teachers specializing in the field of physical education to carry out cultural and educational work for educational purposes.

**Methods and structure of the study.** First and second year students, including those studying in the field of Physical Education, took part in a survey organized on the basis of Perm State Humanitarian and Pedagogical University (FSBEI HE) in cooperation with the Azov State Pedagogical University (FSBEI HE). The purpose of the survey was to identify the degree of their preparedness to conduct cultural and educational work in modern educational institutions. The ability of students to choose suitable forms and methods for the implementation of this activity was also studied. The survey was aimed at assessing the potential of future teachers in the field of organizing and conducting cultural events and educational programs.

**Results and conclusions.** In the presented work, the authors reveal the theoretical basis of the developed model, covering both elements of pedagogical professionalism and creative abilities. The structural components are analyzed in detail, in particular, the process of formation of a value system and the development of basic skills required for the effective implementation of cultural and educational activities. The functional component of the model focuses on applied methods and tools that students can use in their future work. Various approaches to the organization of educational activities aimed at creating a cultural and educational atmosphere both in the educational institution and beyond its borders, involving a variety of stakeholders, are considered. As an illustration, examples of the implementation of the model in the framework of practical training of specialists are given.

***Keywords:*** *cultural and educational activities, students, educational space, culture, education, structural and functional model, educational work.*

**Introduction.** The main social demand and one of the urgent tasks of the state and society is patriotic education and cultural and moral development of the younger generation. There is an understanding of the relationship between civic consciousness based on traditional spiritual and moral values and full-fledged social self-realization in the process of personality development, which should be formed as a holistic model of national education.

**Objective of the study** is to substantiate the structural and functional model of training students of pedagogical universities studying in the profile of training "Physical Education" for the organization of cultural and educational activities aimed at educational work.

**Methods and structure of the study.** On the basis of the Federal State Budgetary Educational Institution of Higher Education "Perm State Humanitarian and Pedagogical University", with the participation of the Federal State Budgetary Educational Institution of Higher Education "Azov State Pedagogical University", a survey of first-second year students was conducted, including those majoring in physical education, in order to determine their readiness for cultural and educational activities in an educational institution

in modern conditions, as well as the ability to select forms and methods of this activity. The survey results were used to build a structural and functional model for preparing students of pedagogical universities for organizing cultural and educational activities in an educational organization.

**Results and conclusions.** The main requirements in the preparation of students of pedagogical universities, in particular, students majoring in physical education, are mastering the theoretical and practical foundations of cultural and educational work, integrating the acquired knowledge into real educational practice and developing the ability to interact with the surrounding cultural environment within the framework of realizing all their capabilities and abilities. This requires students to have not only professional skills, but also personal involvement and understanding of the role of cultural education in the formation of a harmonious personality.

Necessary conditions include adherence to a unified approach not only to the structure of the educational process, but also to the content of the structural and functional model. This implies interdisciplinarity in teaching, the active use of interactive teaching methods, as well as regular extracurricular practical classes aimed at developing and consolidating cultural and educational competencies.

The subject of assessment is the competencies obtained in the course of developing readiness for cultural and educational activities. Evaluation criteria should include analytical work with theoretical material, the ability to apply the acquired knowledge in practice, a creative approach to solving problems, as well as experiences of interaction and cooperation in cultural activities. The implementation of these aspects will ensure the comprehensive training of future teachers who are able to actively and effectively participate in the cultural and educational sphere, promoting advanced educational and cultural technologies in their future pedagogical practices. As the survey showed, the majority (80%) of respondents understand cultural and educational activities as activities aimed at raising the level of education and culture of a person, his intellectual, spiritual development and socialization.

Among the forms of organizing cultural and educational activities, students name conversations, excursions (including virtual and visual guides), games (educational, intellectual, business), master classes, "immersions". It should be noted that many of the respondents name a systematic approach of the educational organization to the implementation of cultural and educational activities and the personal desire of the teacher to engage in cultural and educational activities (60%) as a mandatory condition for full-fledged cultural and educational activities, and 21% of respondents insist on the presence of a high level of knowledge in the field of science and culture of the teacher / educator / mentor as one of the conditions for the success of cultural and educational activities.

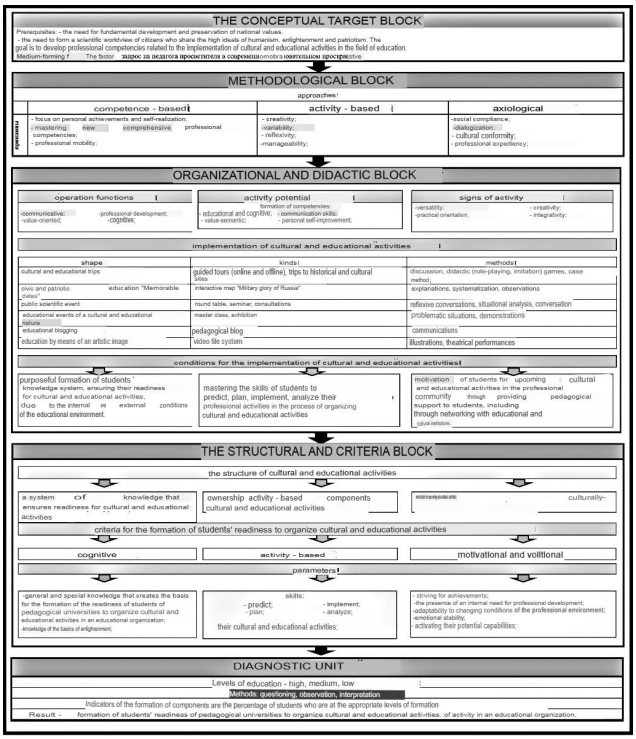
More than 80% of respondents are convinced that cultural and educational activities should initially be based on local, regional material with a gradual expansion to the scale of Russian and world culture.

The results of a survey among students of the Perm State Humanitarian and Pedagogical University allow us to conclude that it is necessary to improve the training of future teachers in the field of cultural and educational activities, taking into account the realities of modern society (a decrease in the level of culture and cultural needs of the majority of the population) and the requirements for preserving traditional spiritual and moral values and value principles of Russian civilization. In the context of a decrease in the level of culture in Russian society, it is the teacher, as a significant adult in the life of a child, who should play the main role in this process as a mentor, patriot and bearer of moral culture. As part of the implementation of this direction, the Perm State Humanitarian and Pedagogical University has developed a structural and functional model for preparing students of pedagogical universities to organize cultural and educational activities in an educational organization, which includes several blocks (see figure).

The structural and substantive components of the presented model are interconnected with the structure of labor functions and qualification requirements enshrined in the "Professional Standard of a Teacher"1.

The model pays special attention to structural elements, such as the formation of value orientations and the development of key competencies necessary for the successful implementation of cultural and educational projects. The functional aspect of the model focuses on practical tools that students can use in their future professional activities. The methods of educa-

[1] Order of the Ministry of Labor of Russia dated 18.10.2013 No. 544n (as amended on 05.08.2016) "On approval of the professional standard "Teacher (teaching activity in the field of preschool, primary general, basic general, secondary general education) (educator, teacher)". - URL: https://www.consultant.ru/document/cons_doc_LAW_155553/.




*The structural and functional model of preparing students of pedagogical universities for the organization of cultural and educational activities*

tional work are considered that allow the formation of a cultural and educational environment in an educational institution and beyond, involving a wide range of participants.

The model provides for the need for continuous analysis of feedback from event participants, which serves as the basis for further improvement of pedagogical approaches in educational practice. The presented structural and functional model serves as the basis for the formation of a new generation of future teachers who are confident in their abilities and ready to implement creative initiatives in the field of culture and education.

**Conclusion.** Thus, the conducted research allowed to identify the main problems in the organization of cultural and educational activities of students of pedagogical universities, to develop a mechanism for preparing students for this activity, the pedagogical community in the form of the implementation of a structural and functional model for preparing students of pedagogical universities for the organization of cultural and educational activities in an educational organization, the components of which are interconnected with the structure of labor functions and qualification requirements of the “Professional Standard of a Teacher”.

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# The use of project activities in the interactive education of undergraduate students studying physical education

UDC 378.1

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**Abstract**

**Objective of the study** aims to theoretically prove the importance of applying project activities in a group format. Its role as an interactive tool contributing to the effective acquisition of natural science knowledge is considered. Special attention is paid to the formation of necessary competencies in the professional education of undergraduate students at institutes of physical culture, sports and life safety. The research is conducted in the context of the implementation of a competence-based approach in education.

**Methods and structure of the study.** The analysis of information sources on the research problem is carried out.

**Results and conclusions.** Practical experience shows that in order to work effectively, a physical education teacher must have a wide range of competencies, including not only professional, but also general cultural knowledge. This will allow him to actively participate in the process of socialization of secondary school students, which implies a high degree of responsibility. It is important to consider the value of each individual, their needs and life goals. The use of project-based methods in the educational process helps to increase the effectiveness of modern approaches to learning, which in turn ensures the high-quality acquisition of necessary professional skills. A key element of project activity is active interaction in small groups, transforming the learning team into a cohesive team with clearly defined tasks and goals. Collaboration contributes to the formation of common value orientations and the acquisition of interpersonal communication experience, which will later be applied in professional activities.

***Keywords:*** *project method, teacher, student, competencies, culture, philosophy, psychology, pedagogy, modern approaches to teaching, interactive activities.*

**Introduction.** High-quality acquisition of natural science knowledge by bachelors of the Institute of Physical Education, Sports and Life Safety works directly to form competencies: general cultural, general professional, and a number of professional. The Federal Law of the Russian Federation "On Education in the Russian Federation", defining the essence of education, includes "competencies of a certain volume and complexity" among modern educational results, which is the aim of pedagogical education, implementing the professional training of bachelors – future teachers of physical education[1] [7].

The use of the project method in the educational process of the Institute of Physical Education, Sports and Life Safety, as well as the Faculty of Physical Education and Sports of the Pedagogical University as one of the practice-oriented, ensures the activity-based nature of training and an interactive basis for acquiring knowledge [2, 4, 6].

**Objective of the study** is to theoretically substantiate the importance of using the project method in a group form as an interactive tool for ensuring high-quality acquisition of natural science knowledge and the formation of competencies in the professional training of bachelors of the Institute of Physical Education, Sports and Life Safety in the context of implementing the competency-based educational paradigm.

**Methods and structure of the study.** The study required identifying key theoretical provisions on the problem, studying the degree of its development and study, revealing the main meanings and aspects, and

[1] Federal Law "On Education in the Russian Federation" N 273-FZ of December 29, 2012 with amendments in 2017-2016. Available at: / http://zakon-ob-obrazovanii.ru/.

certain conclusions were made. Before starting the study, it is necessary to coordinate your efforts with various types of literature. This includes mainly philosophical, psychological and pedagogical sources. It is important to use the project method, combined with the interactive format of communication in the scientific context, which will subsequently allow physical education teachers to competently conduct classes within the framework that involve natural science and health training.

Among other educational institutions, the capabilities of such a university as the Federal State Budgetary Educational Institution of Higher Education "Elets State University named after I.A. Bunin" in the process of mastering the educational programs of higher education 44.03.01 Pedagogical education (profile Physical education) and 44.03.05 Pedagogical education (profiles Physical education, Life safety). And also the educational platform of the faculty of physical education and sports of the Federal State Budgetary Educational Institution of Higher Education "Ulyanovsk State Pedagogical University named after I.N. Ulyanov" and the Federal State Autonomous Educational Institution of Higher Education "Ural State Pedagogical University" was used.

**Results and conclusions.** In this study, the starting points were philosophical and philosophical-pedagogical ideas about the essence of design (N.G. Alekseev, Yu.V. Gromyko, V.I. Zhuravlev, K.M. Kantor, V.V. Kraevsky, I.A. Kolesnikova, V.A. Lektorsky, L.V. Moiseeva, A.M. Novikov, A.V. Rozenberg, V.M. Rozin, G.P. Shchedrovitsky, E.G. Yudin, etc.); modern conclusions about the project method are in demand: from the history and theory of the issue (G.G. Mitrofanov, M.M. Morozova, E.A. Penkovskikh, E.S. Polat, E.F. Tomina), as a pedagogical technology implemented in the context of a personal-activity educational paradigm (K.V. Agnaeva, Yu.V. Bayeva, L.N. Gorobets, L.V. Marennikova); design as an innovation (V.S. Lazarev) [3].

We examine the essence of the project method in the learning process based on its didactic foundations, as generic for the learning process, and therefore we consider the scientific position of E.S. Polat to be important, according to which the project method is considered "as a way to achieve a didactic goal through detailed development of a problem (technology), which should end with a very real, tangible practical result, designed in one way or another ..." [5].

A separate layer of theoretical guidelines consists of ideas and some conclusions that mainly concerned learning in an interactive mode, which, as a rule, is organized within the walls of higher education. Such a theorist as Yu.V. Gushchin worked on the specifics of their use, interactive learning methods were described by N.N. Dvulichanskaya, S.S. Kashlev, L.A. Peskova, I.A. Yurlovskaya and others. It is also interesting to touch upon this issue in the same vein as E.I. Kolesnikova, and the properties of the innovative format of interactive and information features can also be added, as O.G. Smolyaninova did. In interactive methods, it is possible to significantly use the moment of application in higher education, as such researchers as L.N. Vavilova, T.S. Panina, A.P. Panfilova, S.B. Stupina did.

It is necessary to determine what interactive learning is, and this can be helped by a definition that expresses a close relationship between the teacher and students, provided by interactive means, including goal achievement and reflexive techniques. They allow us to come to an important conviction in the effectiveness of interactive methods, means and techniques that include in their area all students without exception, included in the educational process and form a special interaction environment that has a goal and task for implementation [4, 7, 8].

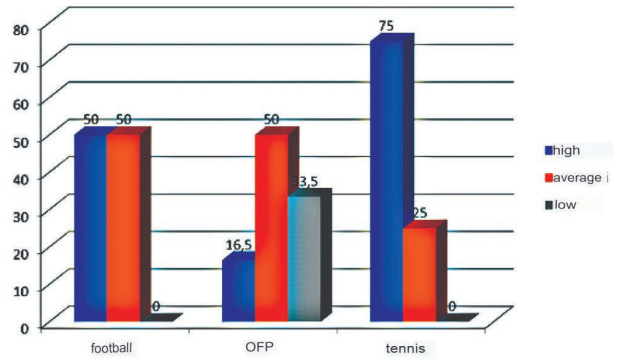
This generates an intensive cognitive process that leaves an imprint on such aspects of existence as communication, interaction, mutual relations. It is aimed at finding some solution and a possible answer to the question posed, implying a mutually beneficial dialogue that brings new information to all participants [4, 7].

Interactivity acquires an essential quality: it is a branching activity and emphasizes the peculiarities of the nature of the relations of the subjects of educational processes, which leads to the formation and sustainable development of personal qualities and professional competencies (see table).

In group project work, the integrated basis for interactive cognitive activity of bachelors consists of: communication regarding the organization of the process of solving the problem, joint creative search and selection of options for its solution (specific features of the implementation of tasks), knowledge of the specifics of modeling, formed skills of necessary actions is assumed, which gives rise to the use of reflexive skills that allow creating a set of project aspirations that result in the organization of joint actions and a specific image of business cooperation, including moral and ethical background, emotional reflection of reality concerning the content of common activities (see figure). Results

*Results of the study of personal qualities and professional competencies of bachelors of the Ural State Pedagogical University*

| Personal qualities | Levels of expression of personal qualities | | | | | |
|---|---|---|---|---|---|---|
| | High | | Average | | Short | |
| | n | % | n | % | n | % |
| Aggressiveness | 2 | 16,5 | 6 | 50 | 4 | 33,5 |
| Level of aspiration | 4 | 33,5 | 5 | 41,5 | 3 | 25 |
| Willpower potential | 2 | 16,5 | 6 | 50 | 4 | 33,5 |
| Achievement motivation | 2 | 16,5 | 8 | 67 | 2 | 16,5 |
| Communicative tolerance | 2 | 41,5 | 6 | 50 | 1 | 8,5 |




*The results of the study on the development of professional competencies of bachelors of physical education and sports of USPU*

of the study of the development of professional competencies of bachelors of physical education and sports of the Ural State Pedagogical University.

The created situation of joint actions generates an atmosphere of group activity, as a result of which specific goals and objectives are achieved, a modern scientific worldview develops, awareness of the problems of ecology and society is based on the main concepts of natural science, which is necessary for a physical education teacher as a professional and citizen [6], environmental education of future physical education teachers as professionals and citizens is carried out [1].

**Conclusions.** The use of the project method in the course of educational procedures allows to increase the effectiveness of modern approaches to training aimed at high-quality development of relevant competencies of professional activity. The key mechanism of project activity is interactive work in small groups, when the educational team is transformed into a friendly team, for which specific goals and objectives are formed. At the same time, in the process of joint work, common value guidelines are formed, experience of interpersonal relationships is acquired, which will be projected onto future work activities.

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# Professional readiness of physical culture teachers to work with students with health disorders: prospects of development

UDC 796

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**Abstract**

**The purpose of the study** is to identify aspects of the professional readiness of physical education teachers to work with students with disabilities in the context of problems and prospects.

**Methodology and organization of research.** Based on the analysis and generalization of special literature, the concept of "Professional readiness of a physical education teacher to work with students with disabilities" is clarified, the main components of readiness are identified, the features and prospects of additional education of specialists are considered.

The results of the study and their discussion. The analysis of the literature made it possible to clarify the concept of "Professional readiness of a physical education teacher to work with students with disabilities", to identify the necessary aspects (components) of readiness, to determine their essence and structure. Prospects for additional education of FC specialists: the use of synergetic and andragogical approaches in advanced training courses (the content of the additional professional program, pedagogical conditions, criteria and diagnostic apparatus).

**Conclusions.** The development of advanced training courses from the perspective of an andragogical approach will contribute to the conscious formation of teachers' professional readiness, taking into account their personal characteristics, professional experience, and motivational guidelines.

***Keywords:*** *professional readiness, physical education teachers, readiness components, additional education, students with health problems.*

**Introduction.** Regular physical activity and sports contribute to health promotion, effective physical rehabilitation and adaptation of people with various health limitations in modern society. The increase in the number of students with disabilities, including those with disabilities, determines the involvement of more specialists who are able to work with this category of students, additional training of current physical education teachers in the field of adaptive physical activity and adaptive sports.

Physical education specialists note professional difficulties and deficits: psychological and practical readiness to conduct classes with students with various physical abilities and disabilities; methodological readiness to develop adapted curricula; communicative readiness for interaction, which confirms the need for continuous professional development to form aspects of readiness for successful professional activity [2].

At the same time, in the programs of advanced training courses, there is often an insufficient focus of the content on eliminating professional deficits and the formation of special components of the readiness of physical education teachers to work with students with various health limitations, the peculiarities of adult education (age and intellectual abilities, interests and needs, life and professional experience) are not sufficiently taken into account [4].

In order to expand the professional competencies of FC specialists and to form readiness to work with students with disabilities, it is necessary to clarify the concept of "professional readiness" and identify the components of readiness, to determine the prospects for the development of high-quality additional education, taking into account the specifics of adult education.

The purpose of the study is to identify aspects of the professional readiness of physical education teachers to work with students with disabilities in the context of problems and prospects.

**Methodology and organization of research.** The research base is the Plekhanov Russian University of Economics. Stages of research:

Stage 1 – clarification of the concept of "Professional readiness of physical education teachers for teaching activities with students with disabilities";

Stage 2 – identification of aspects (components) of readiness;

Stage 3 is a scientific and theoretical substantiation of the prospective development of additional education (advanced training course) to form the readiness of physical education teachers to work with students with various health limitations.

The results of the study and their discussion. The scientific community and representatives of the labor market, noting the discrepancy between the professional competencies of FC teachers and the actual readiness to apply them in practice, point to the need to improve the skills of specialists in order to form a willingness to implement competencies in working with students with disabilities [5]. To clarify the concept of "Professional readiness of a physical education teacher for teaching activities with students with disabilities", the theories and concepts of individual readiness for professional, pedagogical, and inclusive pedagogical activities are considered.

In the study, the phenomenon of "professional readiness for teaching activities with students with disabilities" and the components of this readiness were studied in the field of synergetics: personality – the subject of activity, an open, nonlinear self-organizing emergent system [3]. From the perspective of a synergetic approach, an individual's professional readiness acts as an open complex self-developing system with simpler subsystems (readiness components) included in it, where subsystems, transforming in the process of "overlapping architecture", layering and intersecting, change the entire system and create a new, more economical and efficient system (professional readiness).

Thus, the professional readiness of a FC teacher for pedagogical activity with students with NEOS is an integrative characteristic of a personality (an open nonlinear self–organizing system), which is formed through the synergetic (coherent) interaction of readiness components - subsystems. Professional readiness (an integrative characteristic of a personality) changes under the influence of transformation and the intersection of interdependent subsystems, goes through non-linear (through bifurcation) stages of self-development and self-organization.; It acts as an unbalanced but stable state of readiness of the individual.

Taking into account the different levels of teachers' readiness to implement adaptive physical education technologies, the components of readiness (personal-motivational-developmental, cognitive-activity, and psychological-communicative) were identified; the essence and structure of the professional readiness of a FC specialist to work with students with disabilities were determined (Fig. 1).

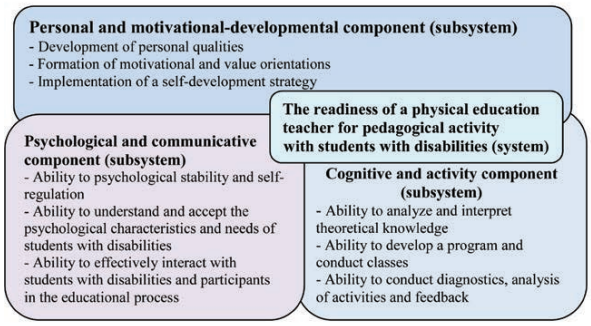


*Figure 1 – The essence and structure of a specialist's readiness system*

From the perspective of the problems of a teacher's professional readiness for this pedagogical activity, the analysis of general professional competencies (GPC) in bachelor's degree programs ("Physical education" and "Physical education for people with disabilities") and labor functions according to professional standards ("Coach-teacher" and "Coach-teacher in AFC and sports"). The generalized results of the study were correlated with the presented system of professional readiness and its subsystems (personal-motivational-developmental, cognitive-activity and psychological-communicative).

In the structure of each component of the teacher's readiness, the criteria of readiness were identified, taking into account the necessary general professional competencies and labor functions for working with students with disabilities, as well as criteria for evaluating the components of readiness (personal-motivational-developmental, cognitive-activity, and psychological-communicative).

In the long-term development of high-quality additional teacher education, researchers point out the need to apply an andragogical approach focused on the characteristics and needs, life and professional experience of adult learners, which will contribute to the effective formation of readiness for professional activity and self-development of teachers.

From the perspective of the andragogical approach, the model of readiness formation acts as an andragogical model of learning (conditions and

structure of learning), which includes an andragogical model of teaching (implements learning conditions through the activity of an andragogue teacher) and andragogical model of teaching (constructs the activity of an adult learner in the learning model) [1].

Effective formation of the readiness of FC teachers within the framework of the advanced training course is possible if: the learning process as a pedagogical system (andragogical learning model), the teaching process as a subsystem (the activity of an andragogue teacher) and the learning process as a subsystem (the activity of a FC specialist in the role of an adult learner) are coherently coordinated and based on andragogical principles. In order to form the professional readiness of a physical education teacher for teaching activities with students with disabilities, it is necessary to solve the following tasks:

1. Formation of a personal, motivational and developmental component based on a value-semantic orientation (acquisition of personal meanings) and cultural conformity (acceptance of humanistic values).

2. Formation of the cognitive-activity component: focusing knowledge on the professional deficits of students, taking into account their experience (individual and personal approach) through solving real problems (environmental conformity).

3. Formation of the psychological and communicative component through role-playing (conformity to nature); development of empathy and acceptance of the characteristics and needs of students (value-semantic orientation).

4. Definition of pedagogical conditions: development of corporate and personal motivation for professional self-development of students-FC specialists; consideration of the characteristics of adult learners; andragogical style of interaction; diagnosis of each stage of training.

From the standpoint of the andragogical approach, in order to effectively form the readiness of FC specialists to work with students with disabilities, it is necessary to identify the initial level of students' readiness for this work (resources and experience, motivation and deficits in the field of adaptive physical education). Taking into account the identified professional deficits and difficulties, an additional professional development program is being developed, which includes step-by-step completion of problematic educational modules of the program and practical assignments. Practice-oriented classes and a strategic session are modeled in the format of workshop marathons for the exchange of knowledge and experience, reflection and feedback between andragogues and listeners. Assessment of the formation of professional readiness of specialists includes criteria and indicators related to the components of readiness, which are checked through theoretical testing, questionnaires, information trail analysis and general expert assessment.

**Conclusions.** The prospects for high-quality additional education (advanced training courses), taking into account synergetic and andragogical approaches, will make it possible to design an educational and developmental environment for adult learners, where each FC teacher has the opportunity to form a conscious willingness to teach with students with disabilities, based on their life and professional experience, culture and values; taking into account personal and age differences. characteristics and needs; striving for personal and professional self-development.

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# Improving the processing of competition results using publicly available digital tools

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**Abstract**

**Objective of the study** is aimed at creating, arguing and implementing a digital model for calculating and analyzing the results of sports events, providing for the transformation of primary indicators into a point system using Microsoft Excel tools.

**Methods and structure of the study.** The research and creation of the product was carried out on the basis of the Faculty of Physical Culture of the Leningrad State University named after A.S. Pushkin. The following criteria were defined in the terms of reference for this program: the ability to simultaneously register the results of competitions in nine disciplines; automatic conversion of recorded totals from time and numerical indicators into a point system with subsequent calculation of the arithmetic mean and rounding to an integer; consideration of gender and age of competitors in calculations; preventing accidental changes to the source data of the "standards" section when working with the program; providing the user with only basic information about the participants and the actual results of the competition as available functions.

**Results and conclusions.** The presented competition data processing methodology, implemented in Microsoft Excel, provides recording of results in various formats, taking into account the gender and age categories of participants. It automatically converts time and numerical indicators into a point system, calculates the average value, rounding it to an integer. The product is designed with protection against unauthorized editing of primary data and adapts to various sports disciplines due to the easily changeable parameters on the "Standards" sheet. The practical value of this development was confirmed during the entrance exams in the subject "Physical Culture" at the LSU named after A.S. Pushkin in the period from 2021 to 2024, where the results were recorded in nine different sports exercises.

***Keywords:*** *information systems, software product, software, Microsoft Excel, 1C: Enterprise, physical education, sports, competitions, actual results of competitions.*

**Introduction.** In order to process the results of competitions, users are usually recommended to use open-source software such as Google Sheets, LibreOffice Calc, Microsoft Excel. The presented programs allow you to create table templates in which you can enter and structure the data of competition participants, results, etc. However, in the field of physical education and sports, in addition to structuring data in tables, there is a need to recalculate the original time or number data into points or scores. For such operations, you can use Google Sheets – an online service that allows you to create and edit tables in real time together with other users. A similar free online service is Microsoft Excel Online. At the same time, for competitions you can use the open system OpenSpi or Sporty, which allow you to keep track of results, calculate points and scores, as well as analyze competitions online and can be used for free. Mobile applications are also used for similar tasks. In particular, Scorekeeper, available for iOS and Android devices, but in the free version with very limited functionality. Along with the well-known universal electronic tables, today organizations have their own programs for calculating various ratings and promptly summing up the results.

**Objective of the study** is to substantiate and develop a computer model for calculating and processing competition results with the ability to convert data from original units of measurement to points using the Microsoft Excel software environment.

**Methods and structure of the study.** Scientific development was carried out on the basis of the Faculty of Physical Education of the Leningrad State University named after A.S. Pushkin.

The technical specifications for the program put forward the following requirements: the ability to record competition results in nine types simultaneously; automatically convert the obtained results from the categories of time and number to points and calculate the arithmetic mean, reducing to an integer; take into account the gender and age of the participants in the calculations; when using the program, exclude the possibility of accidental changes in the initial data in the "standards" category; from the "open" options for the user, leave only the functionality for entering general data on the participants and the actual results of the competitions.

*Input data.* In this software, the input data were divided depending on the user's role in processing the competition results. For methodologists-developers of the evaluation system, the input data are represented by tables of standards in points, taking into account gender and age for a given discipline. For the competition judging panel, the input data are represented by information about the participants, such as: full name, gender, age and other data. Calculation model. For a more detailed examination of the method for obtaining final scores for a discipline, let's consider the formula for calculating the results using the 60-meter dash standard as an example:

=IF(students!E3=»»;»»;IF(students!C3=»m»;INDEX(standards!$B$3:$Z$3;1;MATCH(students!E3;OFFSET(standards!$B$4:$Z$4;IF(students!D3<=29;0;1);0);-1));INDEX(standards!$B$6:$Z$6;1;MATCH(students!E3;OFFSET(standards!$B$7:$Z$7;IF(students!D3<=29;0;1);0);-1))))

The basis of the expression structure is the IF function, which allows you to vary the number of points received depending on the gender of the subject. Next, depending on the gender, the appropriate table is selected. Then, using the MATCH function, the closest value from the standard table is found, rounding down. Additionally, to vary the output score depending on age, the OFFSET function is used, which shifts the table row by which indexing occurs by 0 or 1 row.

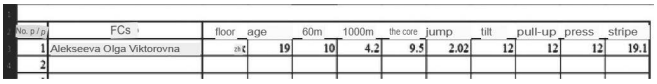
This formula is universal and requires minimal changes when adding a new standard. The range of cells $B$3:$Z$3 is an array of scores sorted in ascending order for males, $B$4:$Z$4 is an array of results for subjects under 29, $B$5:$Z$5 is for subjects 30 years and older. The part of the table for assessing the results of women is similarly structured: $B$6:$Z$6 are scores, $B$7:$Z$7 are the results of persons under 29, $B$8:$Z$8 is for persons 30 years and older. If a different rounding principle is required (for example, for tests where a higher result means a higher score), the comparison type in the OFFSET functions must be replaced with 1 instead of -1.

*Output data.* As noted above, users are divided into two types: methodologists responsible for the assessment standards, and the judging panel, which fills in general information, as well as the results obtained by the subjects. For methodologists, the output data is not defined, since users of this category perform the task of administering the table. As for the judging panel, the output data are the results in points, which are displayed on the "result" sheet.

**Results and conclusions.** The table presents a description of the sheets with the contents of the columns of the created resource. Due to the division of data into sheets, as well as the protection of some

*Contents of the information resource*

| Sheet 1 | Sheet 2 | Sheet 3 | Sheet 4 |
|---|---|---|---|
| **General information** | **Students** | **Standards** | **Result** |
| General information about applicants/students (to be completed by an employee) | Results of completed standards (filled in by the employee) | The sheet is hidden from employees and is a set of tables reflecting the ratio of the original units of measurement to points taking into account gender and age. Editing is possible in case of changes in standards | Consolidation of data from the general information section, as well as the result of converting standards into points |
| Columns: Full name, Registration, type of training (status), specialization, category, rank, additional points, etc. | Columns: Gender, Age, 60m, 1000m, Shot, Jump, Incline, Pull-ups, Press, Obstacle Course | | Columns: Full name; columns of the «Students» section; converted to points; grade - average value of the points received; OFP - grade rounded to an integer; swimming points; points from the «General Information» sheet; sum – final score |



| No. p/p | FCs | floor age | 60m | 1000m | the core | jump | tilt | pull-up | press | stripe |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Alekseeva Olga Viktorovna | 21 г. | 19 | 10 | 4.2 | 9.5 | 2.02 | 12 | 12 | 12 | 19.1 |
| 2 | | | | | | | | | | | |

*Fig. 1. Example of filling out the "Students" sheet*

ranges, the possibility of an error by the verifier is excluded, since the calculation is carried out automatically.

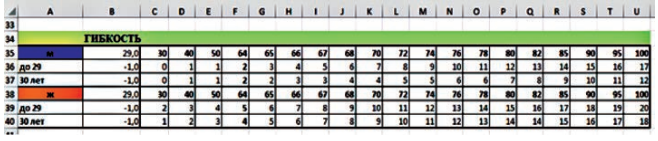
*User Manual.* After filling in Sheet 1 “General Information”, work with the created software resource begins with entering the initial information on Sheet 2 “Students”. Here, a representative of the judging panel enters the results obtained at the competition; information about the participants, such as full name, gender, age, is transferred automatically from Sheet 1.

After entering the actual results on Sheet 2 “Students”, automatic data processing occurs using the standard tables located on the hidden Sheet 3 “Standards”. In this case, the program automatically determines the age category and gender of the participant, selects the appropriate table row, and then, using the embedded algorithm for finding the closest value, calculates the number of points.

The points obtained are automatically transferred to Sheet 4 “Result”. Here, the user can see the final numerical values for each standard, as well as summary information: the average score rounded to an integer, the total score for all types, including additional indicators, if provided. Thus, the user receives a comprehensive assessment of the student’s level of training without the need for manual calculations.

To compare the created product with other information systems used for similar tasks, we reviewed the experience of the South-Russian State Polytechnical University (NPI) named after M.I. Platov and the Federal State Budgetary Educational Institution of Higher Professional Education “State University – UNPK” in Orel.

Thus, an information system for processing the results of sports competitions was developed at SUPU on the 1C: Enterprise platform [7]. Integration of the Telegram bot, implemented on the 1C: Enterprise platform, into the created system became a continuation of the above-described technical solution of the authors [8]. When judging competitions, users of the program talk about the possibility of using it both when



| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ГИБКОСТЬ | | | | | | | | | | | | | | | | | | | |
| м | | 29,0 | 30 | 40 | 50 | 64 | 65 | 66 | 67 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 85 | 90 | 95 | 100 |
| до 29 | | -1,0 | 0 | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 30 лет | | -1,0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ж | | 29,0 | 30 | 40 | 50 | 64 | 65 | 66 | 67 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 85 | 90 | 95 | 100 |
| до 29 | | -1,0 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 30 лет | | -1,0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 14 | 15 | 16 | 17 | 18 |

*Fig. 2. The table of the standard of assessment of flexibility*

holding competitions within educational institutions and in servicing larger-scale events [4].

Despite the undoubted advantages of the platform, a significant drawback is the low competence of workers in the physical education and sports industry, which does not allow creating resources similar to those described above. In addition, the system requirements of this platform may be excessive for the required functionality, since for the simultaneous work of several employees it is necessary to rent a server or deploy a similar infrastructure independently. It should also be taken into account that in order to use “1C: Enterprise” it is necessary to purchase a commercial license.

Employees of the Federal State Budgetary Educational Institution of Higher Professional Education “State University – UNPK” in Orel also use Microsoft Excel tables [5,6]. The authors describe in detail the creation of their resource, which allows users to develop functionality in accordance with their own requirements, based on the instructions of the authors. It should be noted that in this solution, if it is necessary to change the assessment system, it will be more appropriate to create a table from scratch. To confirm this statement, we will refer to the formula for the table cell [5] given in the article and conduct a comparative analysis with the solution developed at the Leningrad State University. A.S. Pushkin. Formula of the authors of the article, Orel [5]: =IF (D2>32;10;0) +IF (((D2>30)* AND (D2<33));9;0)+IF (((D2>28)* AND (D2<31));8;0)+IF (((D2>25)* AND (D2<29));7;0)+IF (((D2>23)* AND (D2<26));6;0)+IF (((D2>20)* AND (D2<24));5;0)+IF (((D2>18)* AND (D2<21));4;0)+IF (((D2>15)* AND (D2<19));3;0)+IF (((D2>13)* AND (D2<16));2;0)+IF (((D2>8)* AND (D2<14));1;0)+IF (D2<9;0;0).

Solution developed at Leningrad State University named after A.S. Pushkin: =IF (students!E3=»»;»»; IF (students!C3=»m»; INDEX (standards!$B$3:$Z$3;1; MATCH (students!E3; OFFSET (standards!$B$4:$Z$4; IF (students!D3<=29;0;1);0);-1)); INDEX (standards!$B$6:$Z$6;1; MATCH (students!E3; OFFSET (standards!$B$7:$Z$7; IF (students!D3<=29;0;1); 0);-1))))

As we can see, in the solution of the authors of the article [5], all standards are written directly in the formula, which may prevent a user with little experience in using Microsoft Excel from editing the standards. In the information resource we have developed, the table of standards is presented in a more convenient form, divided by gender and age. The formula we have created allows a user with little experience in using this

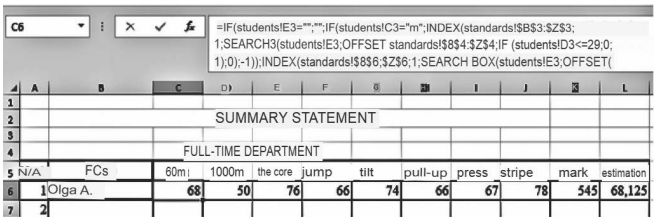



*Fig. 3. An example of calculating scores according to standards*

software to make changes to the standards by adding a new table to the "Standards" sheet and selecting a range by analogy with the presented formula.

The advantages of the software product created at the A.S. Pushkin Leningrad State University are the ability to use it in any competition conditions with the ability to transfer data via cloud technologies in the presence of mobile Internet. Also, if it is necessary to change the assessment system or add a new standard, minimal intervention in the existing functionality will be required.

The ease of use of the presented product is confirmed by the tests and results of practical use in the period 2021-2024.

**Conclusions.** The proposed option for calculating competition results in the Microsoft Excel environment provides the ability to record them in several types at once, taking into account gender and age; allows you to automatically convert the results obtained from the categories of time and number into points and calculate the arithmetic mean, reducing it to an integer; eliminates the possibility of accidental changes in the original data; can be used in different sports due to the ease of changing the data on the "Standards" sheet. The effectiveness of the product was tested during 2021-2024 at the Leningrad State University named after A.S. Pushkin during the entrance examinations in the discipline "Physical Education" with the recording of results in nine types.

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# The role of physical culture and sports in the formation of a well-rounded personality and a healthy lifestyle

UDC 77.03.13

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**Abstract**

**Objective of the study** is to evaluate the role of physical culture in the formation of personality and a healthy lifestyle.

**Methods and structure of the study.** The study, devoted to the study of the influence of physical culture on personality development, involved students of the 5th grade of secondary school No. 6, located in St. Petersburg. The results of the conducted research convincingly demonstrate that sport and physical culture play an important role in the formation of a harmoniously developed personality and leading a healthy lifestyle.

**Results and conclusions.** Regular sports and physical exercises contribute to the improvement of physical qualities such as strength, endurance, flexibility, and maintain the required level of physical activity. In addition, physical activity has a positive effect on the development of a number of psychological qualities, including self-awareness, discipline, self-confidence and the ability to control their emotions. Awareness of the principles of healthy eating helped students maintain optimal weight or reduce excess body weight, as well as form healthy eating habits.

***Keywords:*** *physical activity, personality formation, healthy lifestyle, physical culture, strength, endurance, flexibility, comprehensive personality development.*

**Introduction.** A well-rounded personality is a person who is harmoniously developed in all areas: intellectually, physically, emotionally, psychologically, socially and spiritually.

Physical education and sports play a leading role in maintaining and strengthening health and preventing various diseases, forming a healthy lifestyle, fostering sustainable motivation and a positive attitude towards exercise [1, 7]. Regular exercise helps develop such qualities and skills as persistence, concentration, self-control, restraint, activity, and the ability to overcome oneself. [2, 3, 8].

Regular training helps develop students' mental health: it fosters a sense of fairness, decency and respect for other participants in competitions. In addition, sports help to develop discipline and self-discipline, which is important for success both in school and in professional life. Active participation of students in sports events helps them respect the rules, be tolerant and recognize diversity. In addition, sports activities strengthen moral fortitude and a sense of responsibility, which is important for a mature personality. Sports can also develop leadership qualities and the ability to work in a team. It teaches how to make decisions and be honest and open both to oneself and to others [2, 5, 6, 9].

A healthy style is a way of self-expression of the individuality of students in life by means of physical education and sports, determined by their psychophysiological characteristics, worldview and subjective activity aimed at strengthening health, maintaining performance, physical and self-improvement. A healthy style is not only tracking your own needs and competent treatment of your own body, not only understanding how to work and rest, what to eat, what habits you should not get carried away with, but choosing your environment and priorities, realizing the social significance of your own example and behavior [4, 5].

**Objective of the study** is to study the role of physical education in the formation of personality and a healthy lifestyle.

**Methods and structure of the study.** The experiment involved students of the 5th grade "B" of St. Petersburg Secondary School No. 6. The students were assessed according to the following parameters:

1. Physical health (urine and blood test results, heart rate, pulse); 2. The degree of muscle development corresponding to the body type and age (in points);

3. Mental health, emotional background at the current moment in time (method "Current state");

4. The maturity of the student's personality and the main problems in this area (questionnaire).

After the questionnaire assessment of the maturity of the personality and the interpretation of the results obtained on physical and psychological health on the translation scale, the final scores were presented.

**Results and conclusions.** Testing took place before and after the introduction of mandatory additional physical education classes, which, in turn, consisted of various ways of conducting them, such as:

1) Outdoor games have a positive effect, since they interest in physical development through the prism of a game option, which is more suitable for children's age ("Running", "Pioneerball", jumping rope, "Fishing rod", "Bouncer", etc.

2) Sports games, as a more serious form of outdoor games (football, basketball, etc.).

3) Conducting master classes and communication with children on the topic of physical development and nutrition by professional athletes.

Additional classes were aimed at interesting students in a variety of physical activities, since the purpose of this experiment was the desire of children to attend physical education classes not just for the purpose of getting grades, but because of an understanding of the importance of this aspect. Before the experiment: children had difficulty attending physical education classes included in the school curriculum, often skipped classes or did exercises poorly, not to the end; felt awkward when they had to do an exercise in front of the whole class, were embarrassed by themselves against the background of general insecurity; ate "junk food" (fast food products (fast food, pizza, chips)) and refused school food offered in the cafeteria.

*Indications before and after the experiment*

| Student's name | Physical health | | Mental health | | Personal maturity | |
|---|---|---|---|---|---|---|
| | Before the experiment | After the experiment | Before the experiment | After the experiment | Before the experiment | After the experiment |
| Andrey K. | 1 | 2 | 1 | 3 | 1 | 2 |
| Lisa N. | 1 | 2 | 2 | 2 | 2 | 2 |
| Sveta G. | 2 | 3 | 2 | 2 | 1 | 2 |
| Natasha A. | 2 | 3 | 2 | 3 | 2 | 3 |
| Alexey M. | 1 | 3 | 1 | 2 | 2 | 3 |
| Anna M. | 2 | 2 | 1 | 2 | 1 | 2 |
| Karina A. | 2 | 2 | 1 | 3 | 1 | 3 |
| Sergey M. | 2 | 2 | 1 | 2 | 2 | 3 |
| Nikita Ch. | 3 | 3 | 3 | 3 | 3 | 3 |
| Sofia S. | 3 | 3 | 3 | 3 | 2 | 2 |
| Artem Ya. | 1 | 2 | 2 | 2 | 3 | 3 |
| Stepan T. | 1 | 1 | 1 | 2 | 1 | 2 |
| Mark E. | 2 | 2 | 2 | 2 | 1 | 2 |
| Evgeniya K. | 1 | 2 | 2 | 2 | 1 | 2 |
| Olga V. | 1 | 2 | 3 | 3 | 2 | 2 |
| Evgeniy F. | 2 | 3 | 1 | 1 | 2 | 2 |
| Egor L. | 3 | 3 | 2 | 2 | 2 | 2 |
| Lisa P. | 3 | 3 | 3 | 3 | 3 | 3 |
| Peter M. | 1 | 3 | 1 | 3 | 1 | 3 |
| Pavel I. | 1 | 2 | 2 | 3 | 2 | 2 |

After the experiment: children began to willingly attend physical education classes and show initiative in terms of sports games; many girls and boys showed interest in team sports, which led to an increase in the number of children in special clubs, both within the school and outside of it; children stopped being embarrassed, became more relaxed and began to more easily make contact with their peers; many of them understood and realized the importance of healthy eating.

After the questionnaire assessment of the maturity of the personality and the interpretation of the results obtained on physical, psychological health on a scale of translations (from 1 to 3, where 1 is bad, 2 is average, 3 is good), a comparative analysis "before" and "after" the experiment was conducted, presenting the indicators in a table, assessing the state of physical and mental health, as well as the maturity of the personality.

Thus, the majority of children had low and average physical and mental health before the study, i.e. 1 or 2 points. Only a minimal number of students scored 3 points. We assessed the maturity of an individual by their ability to stand up for themselves, work in a team and take care of their household needs independently. After our study, the indicators improved significantly. Thus, there are almost no students left who have a "1", the number of students who improved their indicators is 15 out of 20.

**Conclusions.** The study shows that physical education and sports play an important role in the formation of moral and ethical qualities of a person. Regular training contributes to the development of fairness, decency and respect for others. In addition, sports help to form discipline and self-discipline, which is important for success, both in school and in professional life.

Active participation of students in sports events helps them respect the rules, be tolerant and recognize diversity, since sports teaches how to work in different teams and appreciate each participant. Sports activities strengthen moral fortitude and a sense of responsibility, which is important for a mature personality.

Sports can also develop leadership skills and the ability to work in a team. It teaches you to make decisions and be honest and open both to yourself and to others. Physical education and sports have a complex effect on the development of students' moral and ethical qualities, which contributes to their personal growth and the formation of social skills.

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# Physical culture and patriotic education of youth as an element of preparation for military service

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**Abstract**

**Objective of the study** is to identify the features of sports and patriotic education in preparing young people for military service.

**Methods and structure of the study.** In the period from 2023 to 2024, a scientific study was conducted, the object of which were young men of draft age (hereinafter referred to as young men) living in the city of Perm and the Perm region. All subjects underwent an assessment of their physical fitness and the degree of development of their main physical characteristics. Additionally, as part of the study, the experience of participating in competitions and events of military and sports orientation with patriotic themes, held in Perm and the Perm region, was analyzed.

**Results and conclusions.** The decline in health and physical fitness of pre-conscription age young men is becoming noticeable due to insufficient physical activity in physical education classes at educational institutions. There are unfavorable changes in the military-patriotic education of the new generation. One of the problems in preparing young people for military service is the fading of patriotism and the prevalence of consumer interests.

Physical and patriotic education plays a key role in preparing young men for military service. The practice of military-sports education of young people in Perm and the Perm Territory is a modern and relevant approach.

***Keywords:*** *sports and patriotic education, teenagers, youth of pre-conscription age, military service, educational organization, physical education, sports, military-applied sports, competitions in sports disciplines, military university, cadets, officers, partnership, patriotism, military security, civil society.*

**Introduction.** Preparation of citizens for military service is an important component both in ensuring military security and in the process of building civil society in the Russian Federation. The basis of this process is the training and education of citizens, the formation of their moral convictions, knowledge, skills and abilities necessary for the performance of duties of military and other state service as intended. This is one of the forms of targeted socialization of young people, in which almost all institutions perform their own functions and tasks. This form of socialization involves complex specific activities, in which military-patriotic education is the basis for preparing young people for military service [2, 4].

**Objective of the study** is to identify the features of sports and patriotic education in preparing young people for military service.

**Methods and structure of the study.** In the framework of military-patriotic activities, special attention, in our opinion, should be paid to sports and patriotic education of "pre-conscription age youth, since the basic factor determining the ability of a citizen to perform military service is the state of his physical development and health.

We have identified the main negative factors affecting the preparation of citizens for military service:

- insufficient amounts of physical activity in physical education classes in educational organizations;
- insufficient development of military-applied sports.

The study was conducted during 2023-2024, in which young men of draft age (hereinafter referred to as young men) from Perm and the Perm Territory were involved. All participants were tested for their level of

physical fitness and development of basic physical qualities.

The overall assessment of the level of physical fitness was determined according to the regulatory requirements for physical fitness for this category of young men. The corresponding assessments were taken as a basis for determining the level of physical fitness and development of basic physical qualities. Thus, the grades "excellent" and "good" were defined as "passed", "satisfactory" and "unsatisfactory" – "not passed". This approach to assessing the physical fitness of young recruits is explained by the use of a conditional "reduction coefficient" to one point (hereinafter referred to as the Coefficient). This Coefficient provides for the correlation of the obtained results taking into account the influence of physical activity and the requirements for the fulfillment of physical fitness standards for young men in the process of adaptation to upcoming military service. The study also examined the experience of competitions and events in military-applied sports of patriotic orientation in the city of Perm and the Perm Territory.

**Results and conclusions.** The results of checking the level of physical fitness and development of basic physical qualities in young men of draft age (hereinafter referred to as young men) in 2023 and 2024 are presented in Table 1.

According to the presented data, along with a slight improvement in the quality of assessments of strength and speed exercises, a decrease in the results in endurance exercises can be observed (from 18.1 to 13.6%). In the future, it can be expected that young men with a low level of physical fitness and insufficiently developed basic physical qualities will subsequently experience significant difficulties in adapting to physical activity and meeting physical fitness standards, as well as mastering exercises with a military-applied focus and sports disciplines of military-applied sports.

According to the results of sports competitions in military-applied sports among young men of pre-conscription age, 76% of all participants fulfilled youth sports categories in 2023 and 2024;

It is expected that in 2025, a greater number of teams will take part in competitions in military-applied sports and, accordingly, the number of people capable of fulfilling youth sports categories. However, the low health and physical fitness of young people is due not only to their low physical activity, but also to the inadequacy of the educational and material base, provision of modern sports equipment and equipment in educational institutions. Despite the fact that in 2024, work was completed on the creation of school sports clubs in all educational organizations, today the organization of their work leaves much to be desired, due to the lack of financial support for the activity, which does not allow this work to be organized adequately.

Due to their specificity, sports and physical education have enormous educational potential, are one of the most powerful mechanisms for the formation of significant ideological qualities of the individual. [3]. A special direction in the development of personal qualities is the formation of a person's readiness to defend his Fatherland through sports with a military-applied focus. By order of the Ministry of Sports No. 829 dated August 25, 2015, the rules of the military-applied sport "Military-applied sport" were approved. However, there are currently very few competitions in sports disciplines of this sport with citizens of pre-conscription age. Thus, in the calendar plan of sports and physical culture and health events for 2025, only 15 events with a military-applied focus are planned for military-applied sports, which is 1.5% of the total number of events and only one event among pre-conscription youth.

Today, the city of Perm strives to become one of the first effective platforms for patriotic education of youth. Since 2025, the Perm regional branch of the military-patriotic movement "Guards Shift" in cooperation with the Perm Military Institute of the National Guard Troops of the Russian Federation (hereinafter referred to as PVI) has begun implementing the project "Young De-

*Table 1. Results of checking the level of physical fitness and development of basic physical qualities in young men of draft age*

| Physical qualities (exercises) | Year of admission | Number of ratings (in percent) | | | | Percentage of completion |
|---|---|---|---|---|---|---|
| | | 5 | 4 | 3 | 2 | |
| **Strength** (pull-ups) | 2023 | 52.6 | 13.1 | 10.0 | 24.3 | 65.7 |
| | 2024 | 58.3 | 12.9 | 8.5 | 20.3 | 71.2 |
| **Speed** (100m dash) | 2023 | 30.2 | 25.2 | 17.1 | 27.4 | 55.4 |
| | 2024 | 25.4 | 30.5 | 20.7 | 23.4 | 55.9 |
| **Endurance** (3 km run) | 2023 | 4.4 | 13.7 | 14.3 | 67.6 | 18.1 |
| | 2024 | 4.4 | 9.2 | 15.9 | 70.5 | 13.6 |

fender of the Fatherland" (hereinafter referred to as the Project), the content of which includes events with a military-applied focus. The project is planned to be implemented in two stages: the first (from February to May) – at the city level and the second (from September to November) – at the regional level. At this time, the first event was held - the city military-sports relay race "Ratnik", dedicated to the "Defender of the Fatherland" Day (hereinafter referred to as the Relay). In 2025, 42 teams from various educational organizations of the city of Perm and the Perm Territory took part in the relay with a total of 462 people.

The relay has been held since 1998, and due to its importance, since 2022 it has been included in the city sports and patriotic festival. It consists of eight stages, in which participants perform exercises and tasks with a military-applied and sports focus. One of the main goals of the Relay is to improve individual motor skills and abilities in young people in a limited time, to form the readiness of the future defender of the Fatherland for coordinated and effective actions as part of a team. The project is carried out with young people during the calendar year in two stages. At the first stage, a mass event accessible to most young people is held – the Relay Race. Subsequently, at the same stage, the Perm city championship (Competition) is held in individual sports disciplines of the sport "Military Applied Sports" for a more prepared category of pre-conscription age young people. The competition is dedicated to the Victory Day in the Great Patriotic War, the program of which includes grenade throwing exercises (F-1) for distance, swimming with a machine gun, and a militarized cross-country race.

At the second stage, two events are held, but with a more complex program, requiring comprehensive military-applied and sports training from the participants.

In order to expand the geography of the Project, it is planned to involve teams from neighboring regions of Russia. The program of the Sports Event includes a large number of sports disciplines and exercises of military-applied orientation. Young men in the age groups of 15-16 and 17 years old are invited to compete in four sports disciplines over three days: "Grenade throwing for distance", "Swimming with a machine gun", "Militarized cross" and "Officer's summer quadrathlon", the components of which are four exercises: pull-ups on the horizontal bar, freestyle swimming 100 (50) meters, shooting from an air pistol and running 3 (1) km.

The meeting of the regional divisions of the children's and youth military-patriotic movement "Guards Shift" is the final event of the Project, the results of which determine the level of physical and psychological readiness of young people for action in conditions close to a service and combat situation.

**Conclusion.** Thus, the study showed that at present there is a decrease in the health and physical development of pre-conscription age youth due to insufficient amounts of physical activity in physical education classes in educational organizations. Negative trends are observed in the field of military-patriotic education of the younger generation. One of the negative factors in the process of preparing young people for military service is the weakening of patriotic feelings, the strengthening of consumer principles. Sports and patriotic education is one of the most important conditions for preparing pre-conscription youth for military service. The experience of sports and patriotic education of youth and adolescents in the city of Perm and the Perm Territory is innovative and in demand in modern conditions.

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# Restoration of knee functions in football players after injuries

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**Abstract**

**Objective of the study** was to develop and test the effectiveness of individual physical rehabilitation programs for football players with knee injuries.

**Methods and structure of the study.** Fifteen football players were monitored from 2022 to 2024 at the City Polyclinic No. 1 in Melitopol, based on the medical and physical culture dispensary. As part of the monitoring, the results of ultrasound examinations were analyzed, the Oxford knee assessment scale was used, as well as a special knee joint assessment scale. Based on the initial examination of the athletes and taking into account their clinical condition and functional capabilities, personalized recovery programs were developed for each of them. These programs included a set of therapeutic physical exercises, physiotherapy procedures and a course of massage.

**Results and conclusions.** Physical rehabilitation was carried out in three consecutive phases: initial, functional and final. During these phases, specific tasks were solved, starting with preventing knee joint stiffness, strengthening the muscular system of the limb and ending with complete restoration of the neuromuscular system and return to sports activities. The success of the implemented measures was confirmed by the improvement of the observed parameters.

***Keywords:*** *athlete, football player, injury, knee joint, effectiveness of physical rehabilitation programs.*

**Introduction.** A common pathology among football players is lower limb trauma, where knee joint trauma is one of the most common [1-3]. Traditional treatment measures from the arsenal of classical medicine are not always effective and require further improvement [4-6]. Physical rehabilitation tools and methods can have a significant impact on improving and increasing the effectiveness of combating this negative phenomenon. The use of modern physical rehabilitation tools for football players with lower limb injuries is a pressing issue at present.

**Objective of the study** is to develop and test the effectiveness of individual physical rehabilitation programs for football players with knee joint injuries.

**Methods and structure of the study.** 15 football players were under observation in the Melitopol City Polyclinic No. 1, based on the medical and physical education dispensary (Melitopol). Ten athletes were diagnosed with grade I and II post-traumatic arthrosis (gonarthrosis) of the knee joints, which was detected using clinical and radiological diagnostic methods.

Sonographic studies were performed on the Hitachi EUB-5500 device using the two-dimensional scanning method (B-method) with a linear transducer with an irradiation frequency of 7.5-10 MHz.

To unify complaints and objectify research methods, patients were examined before and after the use of corrective and restorative programs using the following tests:

1. Oxford knee joint scale, 12 points (according to J. Dawson et al., 1998). The scale characterizes the severity of pain syndrome and the patient's ability to perform normal, everyday loads. The normal indicator is a sum equal to 12 points; in the presence of gonarthrosis, the sum of points increases to 60 (maximum).
2. Knee joint assessment scale, 7 points (according

to J.N. Insall et al., 1976). The scale characterizes the pain syndrome and the functional state of the knee joints. The normal indicator is the sum of points, which is equal to 100; in the presence of gonarthrosis, the sum of points decreases to 0 (minimum).

**Results and conclusions.** Before the start of rehabilitation, patients had various complaints about knee joint injuries. Inflammatory exudative changes in the joints were not detected. Table 1 presents the characteristics of complaints of athletes with knee joint injuries.

Analysis of sonographic signs allowed us to characterize the anatomical and morphometric changes in articular cartilage in cases of acute injury to the knee joint.

Analysis of arthrosonographic signs showed that the most common were: "uneven contour of articular cartilage" and "increased height of articular cartilage", and the least common was a decrease in the height of articular cartilage. According to the study, injuries to the meniscus of the right knee joint were predominant in athletes (53.3%), with the inner meniscus being damaged much more often than the outer meniscus.

Using the Oxford Knee Scale and the Knee Assessment Scale, we determined the scores characterizing the motor and functional state of the damaged knee joint. Thus, the average score for the Oxford Knee Scale was 31.53 points, and for the second scale, 68.6 points.

After the initial examination of patients, taking into account their clinical and functional indicators, we developed individual physical rehabilitation (PR) programs: a set of therapeutic exercises (RG), physiotherapy procedures, and massage.

The FR program was planned taking into account the goal and objectives at each stage of recovery. The goals and objectives of rehabilitation after meniscectomy were divided into three stages:

The 1st (gentle) stage of FR refers to the early postoperative period (from the 2nd day after surgery). Objectives: normalization of the trophism of the operated joint and relief of traumatic inflammation; stimulation of the contractility of the limb muscles, primarily the thigh muscles; counteraction of physical inactivity, maintenance of the athlete's overall performance; prevention of contracture of the operated joint.

The following means are used to solve the set tasks: treatment by position (the operated limb is placed in a mid-physiological position at a flexion angle of 135° on a Behler splint to create rest and reduce tension in the joint capsule when inflammatory fluid accumulates in it). The main form of FR is exercise therapy, which is performed in the initial positions of lying on the back, on the stomach, sitting, standing, on the healthy leg. From the 2nd day after the operation, in the absence of hemoarthrosis (synovitis), isometric tension of the quadriceps femoris is used in the form of special exercises. The dosage of isometric tension of the thigh muscles after the operation is 1-2 seconds, and then 10-20 seconds and 1-2 minutes. To prevent flexion contracture of the knee joint, in the absence of effusion into the joint, on the 6th-7th day after the operation, the end of the bed on the side of the lower limbs is lowered. Laying down to extend the operated joint is performed. For this, a 5-10 cm diameter roller is placed under the heel so that the operated joint sags

*Table 1. The nature of complaints of athletes with knee joint injuries (arranged by frequency of detection)*

| Complaints of examined sportsmen-football players |
|---|
| Knee pain |
| Presence of hemarthrosis |
| Pain on palpation of the medial femoral condyle |
| Swelling of the medial quadriceps muscle |
| Limited movement in the joint |
| Joint block |
| Pain on palpation of the medial joint space |
| Patellar instability symptom |
| Knee pain during standing up |
| Pain in the patellar facet area |
| Presence of synovitis |

*Table 2. Sonographic signs of acute injury to the knee joint*

| Sonographic signs | Number of athletes, n=15 |
|---|---|
| Decrease in the height of articular cartilage | 3 |
| Increasing the height of articular cartilage | 8 |
| Homogeneous structure of articular cartilage | 6 |
| Heterogeneous structure of articular cartilage | 5 |
| Uneven contour of articular cartilage | 10 |
| Fragmentation of the outer contour of articular cartilage | 4 |

slightly. The athlete is in this position for 5-6 minutes, and then the duration of the laying down is increased to 7-10 minutes. The laying down is repeated twice. By the 10th day, it is possible to completely eliminate flexion contracture. General developmental exercises for all muscle groups are included in the therapeutic gymnastics classes. The duration of physical therapy sessions was initially 15-20 minutes, and by the end of the recovery stage it reached 30-40 minutes. Therapeutic massage and other physiotherapeutic procedures were performed for those patients who did not have confirmed signs of synovitis.

II (functional) stage of physical therapy (10-12 days after surgery). Objectives: elimination of knee joint contracture; restoration of normal gait; adaptation to long walking and household loads; strengthening of the muscles of the operated limb.

The following forms of physical therapy are used: physical therapy sessions in the gym, physical exercises in the pool, walking training, independent training of athletes in the ward to perform motor tasks. In physical therapy sessions, complex strength training machines are used to train the strength endurance of the muscles of the operated limb. Exercises on a bicycle ergometer are also used for all muscle groups. A special exercise is a half-squat, which is performed in front of a mirror in order to control the uniform pressure of the load on both legs. Duration of classes is 60 minutes. Classes are held twice a day. Physical exercises in the pool are held twice a day. at a temperature of +30-32°. The following exercises are performed: walking – light exercises for the operated joint in order to eliminate residual effects and strengthen the muscles of the thigh, buttocks and shins, swimming crawl on the chest and back. Duration of classes is 20-40 minutes. Walking training was conducted: on the first day, at a pace of 80 steps / min, athletes walk 1 km in 10 minutes. Over time, the distance and time of walking increases (up to 30-45 minutes).

Stage III (training) of the physical rehabilitation (16-18 days after surgery). Objectives: complete restoration of the function of the operated joint; restoration of strength endurance and speed-strength qualities related to the specifics of the sport.

The main means of rehabilitation are physical exercises, which in volume, specificity and intensity are close to the initial stage of sports training. Physical exercises lasting up to 1.5-2 hours were held in the gym and in the pool. The lesson included slow running at the beginning, then on the treadmill. After two or three training sessions, slow running in natural conditions was included. Football players performed exercises with a ball on the spot (receiving and passing a football, etc.).

The massage procedure was prescribed with special care and strictly individually. First, segmental massage was used (the lumbar region and the healthy limb are massaged). If there was no plaster cast, then ice application was used for the first two days. On the 2nd-3rd day, segmental massage was combined with active-passive movements on the side of the diseased joint with a small amplitude. The technique of knee joint massage was gentle, using stroking, and in the following days - rubbing. Particular attention was paid to the massage of the quadriceps muscle of the thigh using rubbing, kneading and shaking. The massage was carried out for no more than 10-15 minutes.

At the last stage of the recommended FR program, massage was used according to the author's technique.

After rehabilitation measures, all patients showed positive dynamics of the condition: the sum of points on the Oxford scale for the knee joint decreased by 8.49 points, and the sum of points on the second scale for assessing the knee joint increased by 9, 10 points. A significant decrease in pain in the affected joints at the end of rehabilitation measures was observed in 13 patients and a decrease in the severity of pain in two. Thus, the overall effectiveness of rehabilitation in the main group was 86.7%. After completion of the rehabilitation course, 12 patients who had complaints of limited motor activity showed an increase in the range of motion in the knee joint. In 12 out of 15 patients, the range of motion in the knee joints increased. On average, the increase in the range of motion was 9.2o - from 122.89o to 132.09o. In addition to a decrease in pain in the affected joints, patients also showed other positive dynamics of motor activity: an increase in walking distance, an increase in muscle strength and an increase in the range of motion.

Thus, we developed a physical rehabilitation program that included three stages: gentle, functional, and training. At the stages of rehabilitation, problems were solved, starting with the prevention of contracture in the knee joint, strengthening the muscles of the limb and up to complete restoration of the neuromuscular system and professional sports performance.

**Conclusions.** The main manifestations of meniscus damage in athletes are pain, limited movement, joint block, anatomical and morphological lesions of

the cartilaginous tissue are observed. Adequate, timely and comprehensive treatment of this pathology, of which FR is an integral part, leads to the continuation of active sports activities and the achievement of high sports results.

Complex health and recovery measures aimed at eliminating the manifestations of knee joint pathology provide for the combined use of traditional forms of therapeutic physical culture, massage, physiotherapy at three stages of FR. The use of both traditional and non-traditional means and methods of FR should be scientifically substantiated and differentiated.

A correction program with the inclusion of various forms of therapeutic physical culture, massage and physiotherapy should be based on the individual characteristics of a particular patient. The appointment and use of individual correction and recovery programs significantly improves the physical and mental state of athletes after knee injuries.

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# Improving the physical abilities of students of the Institute of Social Engineering that are important for their future profession through the use of mini-volleyball

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**Abstract**

**Objective of the study** is to identify the influence of the mini-volley game on the development of professionally important physical qualities of students at the Institute of Social Engineering.

**Methods and structure of the study.** To determine the key professional physical qualities of students, a survey was conducted, in which 19 teachers from the Department of Physical Education and Health, as well as the Institute of Social Engineering of the Siberian State University named after M.F. Reshetnev took part. The study itself involved 30 second-year students of the ISI of the Siberian State Agrarian University named after M.F. Reshetnev. The control group (15 girls) was represented by students of the directions 44.03.01 "Pedagogical Education" and 39.03.02 "Social Work". The experimental group (EG) also consisted of 15 girls studying in the direction 45.03.02 "Linguistics". The students from the control group trained according to programs including volleyball and basketball, while the participants of the EG studied the technique and tactics of playing mini-volleyball for two semesters (36 hours in each).

**Results and conclusions.** It has been determined that such physical qualities as coordination, reaction speed and general physical endurance are critically important for successful professional development of graduates of the Institute of Contemporary Art (ICA). The study experimentally confirmed the effectiveness of using mini-volleyball in the training process in professional and applied physical education (PAPE) to improve coordination and speed skills, which are key physical attributes for ICA students. The developers propose integrating additional classes, including elements of mini-volleyball, into the curriculum of the PPE discipline for ICA students, with a total duration of 72 hours.

***Keywords:*** *students of the Institute of Social Engineering, mini-volleyball, professionally important physical qualities, coordination, endurance, speed abilities.*

**Introduction.** The problem of improving the physical fitness of ISI students is poorly studied and is relevant. Analysis of scientific literature [4], a survey of university teachers conducted by the authors showed that professionally important physical qualities for the future professional activity of ISI students include coordination skills (agility), speed abilities (speed of visual-motor reaction) and general endurance. Analysis of physical fitness of students conducted over 10 years shows that the level of strength abilities of ISI girls is, on average, significantly lower (at $p < 0.05$) than students of the Institute of Forest Technology (IFT) and the Institute of Chemical Technology (ICT).

Often, ISI students, due to insufficient physical fitness, are not able to fully demonstrate themselves in team sports such as basketball and volleyball, which leads to a decrease in involvement and motivation for classes, absences from classes, and an increased risk of injury. In our study, we proposed to integrate the game of “mini-volley” into the curriculum of the PPFK of students of the ISI in the amount of 72 hours, which will allow more productively to develop their professionally important physical qualities, increase motivation for classes, and create a favorable emotional background in them.

Krasnoyarsk Krai is one of the regions where the game of mini-volley is developing both at the profes-

sional and student levels. This game is included in the number of types of the University Spartakiad held among the teachers of the Siberian State University named after Reshetnev.

An analysis of scientific papers included in the RSCI database allowed us to establish that mini-volley as a game begins its history on the island of Hokkaido, in 1972 Hidetoshi Kojima launched his project in Japan. In 2011, in St. Petersburg, at the international congress "Man. Sport. Health", Hidetoshi Kojima presented mini-volley to the general public [1, 2]. An analysis of scientific literature has shown that the use of mini-volleyball in physical education classes increases motivation for classes among both senior and higher education students [2, 3]. A survey of students showed that mini-volleyball is the most interesting game in terms of content in physical education classes [1].

Unlike volleyball, the mini-volleyball game, in our opinion, is safer for ISI students; it is played on a smaller playing field with a lighter ball and a low net. The game does not require technical training of students. However, due to the higher speed and unpredictability of the ball's trajectory, the participants in the game must be constantly as focused as possible and quickly respond to the game actions of their opponents. In our opinion, the game motor actions performed during the mini-volley game have a positive effect on the development of professionally important physical qualities of ISI students.

Objective of the study is to identify the influence of the mini-volley game on the development of professionally important physical qualities of ISI students.

Methods and structure of the study. The study involved 30 second-year students of the Institute of Social Sciences of the Siberian State University named after M.F. Reshetnev. The control group included 15 girls studying in the fields of study 44.03.01 "Pedagogical Education" and 39.03.02 "Social Work", the experimental group included 15 girls studying in the field of study 45.03.02 "Linguistics". The experiment was conducted over two semesters of the 24/25 academic year, during PPFC classes. At the initial stage of the experiment, in order to obtain the initial indicators of physical fitness and the functional state of students in both groups, pedagogical testing was conducted. To assess physical fitness, the following tests were used: 2000 and 60 meter runs, 3x10 meter shuttle run, simple visual-motor reaction tests, tennis ball throws for accuracy, and the functional state – the Ruffier test. Students of the KG in the autumn-winter and spring-summer semesters studied volleyball and basketball programs, while students included in the EG for 36 hours in each of the two semesters learned to play mini-volleyball. In the survey, in order to identify professionally important physical qualities of students of the ISI, 19 teachers of the Department of Physical Culture and Sport and the Institute of Social Engineering of the Siberian State University named after M.F. Reshetnev took part.

Results and conclusions. As a result of the analysis of scientific literature and the survey of teachers of the Siberian State University named after M.F. Reshetnev, the authors of the study found that the professionally important physical qualities of students include coordination (agility), speed abilities and general endurance. Comparative results shown in the tests at the initial and final stages of the pedagogical experiment were processed using the Mann-Whitney U-test (see table).

*Comparative results of testing ISI girls at the initial and final stages of the pedagogical experiment*

| Test | To | | U-emp. | U-kr. | P | After | | U-emp. | U-kr. | P |
|---|---|---|---|---|---|---|---|---|---|---|
| | CG (n=15) | EG (n=15) | | | | CG (n=15) | EG (n=15) | | | |
| | $\bar{X}\pm\sigma$ | $\bar{X}\pm\sigma$ | | | | $\bar{X}\pm\sigma$ | $\bar{X}\pm\sigma$ | | | |
| 60 meter dash, s | 13,3±0,71 | 13,2±0,63 | 90 | 64 | >0,05 | 13,1±0,66 | 12,4±0,58 | 38 | 64 | <0,05 |
| Shuttle run 3x10 meters, s | 12,5±0,69 | 12,4±0,67 | 85 | 64 | >0,05 | 12,5±0,64 | 11,9±0,55 | 43 | 64 | <0,05 |
| 2000m run, min:s | 13:08±12,99 | 13:04±12,74 | 81 | 64 | >0,05 | 12:58±11,35 | 12:55±11,19 | 78 | 64 | >0,05 |
| Speed of visual-motor reaction, cm | 5,4±0,52 | 5,3±0,51 | 79 | 64 | >0,05 | 5,4±0,51 | 4,1±0,37 | 25 | 64 | <0,05 |
| Tennis Ball Throwing Accuracy, Number of Hits out of 10 Throws | 4,59±0,81 | 4,73±0,78 | 75 | 64 | >0,05 | 4,78±0,79 | 5,87±0,64 | 32 | 64 | <0,05 |
| Ruffier test, Ruffier index | 7,4±0,81 | 7,4±0,77 | 92 | 64 | >0,05 | 7,1±0,79 | 7,0±0,73 | 87 | 64 | >0,05 |

*Note: ISE – Institute of Social Engineering, $\bar{X}$ – average value of the sample, CG – control group, EG – experimental group, U-emp. – empirical value, U-cr. – critical value, σ – standard deviation, n – number of subjects in the group, P – significance level.*

When obtaining the initial indicators of physical fitness and functional state of the subjects through pedagogical testing, at the initial stage of the experiment we failed to identify reliable intergroup differences (at $p > 0.05$) in any of the tests. This indicates the homogeneity of the study groups and approximately the same level of physical fitness and functional state of all subjects. Low standard deviation coefficients in all tests indicate a small spread of indicators within the groups.

After conducting the experiment with the use of mini-volleys in PGFC classes in the EG, we noted reliable differences between the groups at a 5% significance level in the following tests: 3x10 meter shuttle run, 60 meter run, speed of visual-motor reaction and tennis ball throws for accuracy. No differences were found between the groups in the 2000 meter run and the Ruffier test, which indicates the same functional state and general endurance of the subjects of both groups before and after the experiment.

**Conclusions.** The study found that professionally important physical qualities necessary for the future professional activity of ISI students include coordination and speed abilities.

The study experimentally proved the effectiveness of using the mini-volley game in the PPFC classes of ISI students. The authors proposed to supplement the curriculum of the PPFC discipline for ISI students with classes using the mini-volley game in the amount of 72 hours. This will allow more effectively developing the professionally important physical qualities of ISI students, increasing motivation, and creating a favorable emotional background in PPFC classes.

We did not establish a positive effect of the mini-volley game on the development of general endurance of students, and noted the need for further research on the presented topic.

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# The educational structure of students' sports training in the framework of physical education classes at a higher educational institution

UDC 796

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**Abstract**

**Objective of the study** to substantiate and formulate the term “cultural code in sports”, define its functions, and also identify the relationship between its types and categories.

**Methods and structure of the study.** In the course of the research, the following methods were applied: general (collection and analysis of scientific research and the available source base on the problem under consideration), general logical (generalization, comparison, analogy, comparison, systematization, etc.).

**Results and conclusions.** The authors indicate that the cultural code in sports is a multifunctional system. The following functions have been identified and defined: accumulative, diplomatic, identification, image, integrative, communicative, cognitive, aesthetic, which are responsible for preserving the ideals and values of sports, creating a favorable friendly atmosphere in the sports arena, and are aimed at uniting people for the implementation of cultural interaction.

Based on the system analysis of the totality of components of the cultural code, a structure of the relationship between the types and categories of the cultural code in sports has been developed.

***Keywords:*** *cultural code in sports, classification of cultural code, functions, meaning, types, categories, relationships.*

**Introduction.** The modern process of physical education of students in non-physical education universities is aimed at the physical training of young people and the formation of general physical education competencies, which in general does not motivate the student contingent to systematically engage in physical education and sports. In general, an "average" process of physical education is organized, aimed at minimally maintaining physical activity, without taking into account the individual abilities of those involved. In addition, there is a decrease in the number of teaching and practical hours for physical education of students in the country's universities, where up to 70% or more of classes are held only in the 1st and 2nd years, and in the third year – at best, electives. We also note that up to 20% of the teaching hours for physical education are transferred to a lecture course, which does not provide students with the necessary physical activity. The best theory of physical education is practice. The need to introduce a sports-specific approach into physical education of students will help increase students' motivation, realize their individual motor potential, and form a sustainable sports culture, which will allow young people to cultivate their chosen sport in their future professional and social life.

At the same time, the Minister of Sports of Russia M.V. Degtyarev identified one of the main tasks for improving the physical education and sports movement in the country through the development of a sports-oriented approach in physical education of student youth in Russian universities.

Objective of the study is to theoretically substantiate and develop a pedagogical model of students' sports training in physical education at a university and recommend it for practice.

**Methods and structure of the study.** The studies were conducted during 2024 at the Russian State Agrarian University – Moscow Agricultural Academy

named after K.A. Timiryazev. The following methods of collecting information were used in the study: analysis of scientific and methodological literature on the subject, questionnaires, conversations, pedagogical observations, expert opinions, systematization, modeling, abstraction, etc. All this generally contributed to the collection and systematization of the necessary scientific and methodological material, and further development of an experimental model for designing sports training in physical education of students at a university.

**Results and conclusions.** The conducted scientific and theoretical analysis, systematization of the studied material and abstraction contributed to the development of an experimental model of sports training of students in physical education at a university.


*Fig. 1. Theoretical model of sports training of students in physical education at the university*

As shown in Figure 1, the experimental model includes four consecutive functional blocks of sports training of students in physical education at the university: initial specialization, advanced, improvement block and participation in student sports competitions.

**Conclusion.** The developed theoretical model of sports training of students at the university is optimal and compact, does not contradict the general methodological principles of the sports training system and can be recommended for testing in universities of the country.

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# Students' perception of their own self-esteem and improvement of their psychophysiological abilities

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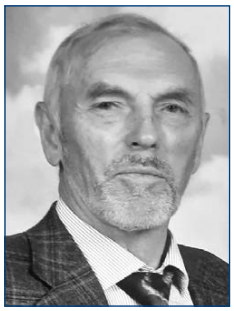

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**Abstract**

**Objective of the study** is to assess students' attitudes towards self–esteem and the development of their psychophysical potential.

**Methods and structure of the study.** In accordance with a specially developed methodology, students' behavior was monitored in the process of passing the TRP standards. At the same time, some of their psychological characteristics were evaluated. 46 students of the Stroganov Moscow State Academy of Art and Industry became the object of observation.

**Results and conclusions. T**here is a lack of interest among students in self-analysis and evaluation of their psychophysiological and cognitive qualities. Along with this, the results of motor coordination tests revealed that a significant part of the students' level of motor skills development leaves much to be desired, which is probably a consequence of deficiencies in physical development and education received in childhood and adolescence. Probably, many students do not fully realize that modern life and the professional sphere are a continuous struggle for promising positions and a decent standard of living. This aspect of the psychocognitive characteristics of Russian students and young professionals raises concerns and needs a deeper and more thorough study.

***Keywords:*** *psychocognitive properties, striving for career growth, TRP tests, self-assessment, development of psychophysical potential.*

**Introduction.** Voluntary actions and work activity of a person are controlled by the brain, in which instincts and conscious thoughts about desires, needs and goals are constantly raging. The huge role of the "unconscious psyche" in human behavior was noted by Z. Freud, K. Jung, A. Maslow [6, 7] and other psychologists, while consciousness and reason (cognition) are called upon to limit the influence of instincts on human behavior, which ultimately forms his psychocognitive abilities (properties, functions). These properties are clearly manifested in educational activities, especially during examination sessions and when performing physical fitness tests.

**Objective of the study** is to assess the attitude of students to self-esteem and the development of psychophysical potential.

**Methods and structure of the study.** Motor tests are a tool for quantitative assessment of psychocognitive properties, functional reserves of body systems (health) and physical performance of a person, allowing to describe his psychophysical profile and activity potential. Instincts (laziness, unwillingness to exert oneself, fear of embarrassment, fear of pain, etc.) always invisibly participate in human actions, which affect the results of motor tests. Human psychophysical potential - as an indicative expression of a set of quantitatively measured indicators of health, psychocognitive properties and physical performance, is the basis for achieving life goals in a changing environment [3]. The VFSK GTO tests, approved by the Decree of the President of the Russian Federation in 2014, are an important tool for quan-

*Protocol of observations and assessment of psychocognitive personality traits observed in motor tests*

| № | Psycho-cognitive personality traits | Students code | | | | | |
|---|---|---|---|---|---|---|---|
| | | Stud 1 | Stud2 | Stud2 | Stud2 | Stud2 | Stud2 |
| I1 | Be attentive when explaining test objectives | 1 | 1 | 2 | 1 | 2 | 2 |
| I2 | Desire to pre-test the test | 1 | 2 | 1 | 2 | 1 | 2 |
| I3 | Desire to know test standards | 2 | 3 | 2 | 3 | 3 | 2 |
| I4 | Test result in relation to age norm | 2 | 3 | 2 | 3 | 3 | 2 |
| I5 | Accuracy of movements to a given test model | 2 | 2 | 3 | 1 | 2 | 1 |
| I6 | Self-control of the quality of movements | 1 | 2 | 3 | 2 | 3 | 2 |
| I7 | Motivation when taking tests | 1 | 4 | 2 | 1 | 3 | 3 |
| I8 | Self-satisfaction with test results | 4 | 3 | 4 | 4 | 2 | 4 |
| I9 | Desire to compare test data with age norm | 3 | 2 | 4 | 1 | 3 | 4 |
| I10 | Desire to repeat the test and improve the result | 1 | 3 | 3 | 2 | 2 | 3 |
| **Ia** | Interest in self-monitoring and assessment of PFP: (I1+I2+I3):3= | 1,3 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| **IB** | Efficiency of motor actions: (I4 + I5 + I6):3= | 1,7 | 2,3 | 2,7 | 2,0 | 2,7 | 1,6 |
| **IC** | Striving for self-development and career growth: (I7 + I8 + I9 +I10):4= | 2,5 | 3,0 | 3,2 | 2,0 | 2,5 | 3,5 |
| Ipc | Psychocognitive status of personality (I1+I2+I3+ I4+ I5+ I6+ I7+ I8+ I9+ I10):10= | 1,8 | 2,4 | 2,6 | 2,0 | 2,4 | 2,5 |

titatively assessing the physical fitness and health reserves of the population [2]. Students' attitudes to these tests and motivation when completing them reflect a number of psychocognitive properties important for a personal career.

Measuring and assessing human mental properties is always based on the principles of reduction and convergence, and the estimates obtained remain approximate. According to a special protocol, observations were made of students' actions when performing the GTO complex tests and a number of students' mental properties were assessed. Along with this complex, students performed a test with complex motor actions (throwing six tennis balls at the wall and catching them with one hand), which reveals the efficiency of the brain and sensorimotor (cognitive) functions of a person [3, 4, 5]. The starting point for assessing the demonstrated psychocognitive properties was the compliance of the student's test movement pattern with the standard test model, as well as a comparison of the test results with the standards of the GTO bronze badge [2].

The validity of the assessments of the studied human mental properties always depends on the qualifications and experience of the observers, and may have significant differences. These observations were conducted by PhD, Associate Professor; Senior Lecturer, Department of Physical Culture, University; DSc, Professor – Head of the Laboratory, State Research Center of the Russian Federation, Institute of Biomedical Problems, Russian Academy of Sciences. Observations were conducted on the actions of 46 university students during the GTO complex tests and 10 selected psychocognitive properties were indicatively assessed (table protocol). Each motor test has a clear parametric model, which was explained to students verbally, using poster pictures or direct demonstration of the tests. A standard protocol and a five-point scale were developed to assess the mental properties of students.

The final protocol additionally includes indices of three calculated properties: Ia – the individual's interest in self-control of the psychophysical profile; Ib – the effectiveness of motor test actions; Ic – the desire for self-development and career growth, which are calculated on the basis of the "particular" properties that have already received assessments. The final protocol also notes the value of the index – the psychocognitive status of the individual (Ipc-PKSL), which is calculated by averaging the assessments of 10 "particular" properties. The rank scale of values for all controlled psychocognitive personality traits is determined by the dimension from 1.0 to 5.0 points, with a median value of 2.5 points and gradation: 1.0-2.0 points – very low level; 2.1-3.0 points – satisfactory; 3.1-4.0 – high; 4.1-5.0 points – very high level.

Results and conclusions. The indices of three "integrated" and conditional "psychocognitive status" of students were calculated on the basis of the formulas shown in the protocol.

Expert observations revealed that 72% of students have an extremely low interest in "self-control and assessment of psychophysical and cognitive properties", which may be due to their insufficient awareness of the value of their health level, the intensity of the upcoming work and the high demands of future employers. The accuracy of motor actions in tests (motor dexterity) is also low in most students. Motor dexterity, according to biomechanic N.A. Bernstein, is an important intellectual (cognitive) property [1]. The shortcomings of the upbringing and education of young people include "the absence of a pronounced desire for self-development and career growth". In this approach, the psycho-cognitive status of the individual (PCSI) is considered as an indicative expression of a limited number of personal properties displayed and observed when students perform a set of psychophysical tests.

**Conclusions.** The study revealed a low interest of students in self-control and assessment of psychophysical and cognitive properties. In addition, the accuracy of motor actions in tests (motor dexterity) in most students is also at a low level, which should be attributed to the costs of physical education and training in childhood and school age. Most students, apparently, do not realize that life and career are a constant competition for high-paying work and quality of life. This segment of the psycho-cognitive properties of Russian students and many young professionals is of concern and requires additional serious analysis.

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# Behavioral effects of sports experience on the physical activity of students in the process of studying at a higher educational institution

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**Abstract**

**Objective of the study** is to identify the dependence of students' motor activity during university studies on previous experience in sports activities.

**Methods and structure of the study.** The data was collected through an anonymous survey in which 165 students (75 young men and 90 girls) participated. The questionnaire included 52 questions aimed at studying the experience and duration of a particular sport, the level of physical activity, the main reasons for the decrease in motivation to engage in physical education, as well as participation in mass sporting events during the first academic semester.

**Results and conclusions.** Upon admission from a school to a higher education institution, there is a decrease in the number of young people involved in physical culture and sports activities. An important aspect of motivating students for sports activities is taking personal interests into account when planning sports events.

***Keywords:*** *high school students, university education, physical education, physical exercises, motor activity, behavioral motives.*

**Introduction.** Systematic physical exercise is a significant factor in improving physical and psychological performance, mood, well-being, and cognitive functions. Studies show that approximately 40-60% of higher education students do not receive the recommended amount of physical activity [4]. Statistics indicate a significant decrease in physical activity in the 18-24 age group [2]. Due to the transition of young people from secondary school (adolescence) to higher education (adolescence), the decrease in physical activity is due to an increase in the educational load and a limitation of physical education and sports activities [6]. Since healthy lifestyle competencies are formed during the period of study, a decrease in students' physical activity is negative [5]. The first step in involving higher education students in physical education and sports activities is to gain knowledge about the models and key determinants of independent [3] physical activity of students. Knowledge and understanding of behavioral motives in the field of physical activity and its determinants provide a fundamental basis for improving physical fitness and improving the general health of students [1].

**Objective of the study** is to identify the dependence of students' physical activity during their studies at a university on their previous experience in sports activities.

**Methods and structure of the study.** The representative sample consisted of 165 students (75 boys and 90 girls) aged 20.5 ± 0.5 years. The selection of subjects was carried out using a stratified multi-stage sampling procedure with proportional distribution. Depending on the year of study, 1st-year (34.7%), 2nd-year (26.4%) and 3rd-year (25.1%) students took part in the study. Data collection was carried out using an anonymous questionnaire consisting of 52 questions regarding experience and length of service in a particular sport, level of physical activity, main reasons for decreased motivation to exercise, participation in physical education and mass events in the first aca-

demic semester. Statistical data analysis was carried out using Statistica 14.0.

**Results and conclusions.** Based on the analysis of involvement in physical education and sports activities, it was found that 8.8% of students had never been involved in school sports sections. As the reasons for reduced motivation for sports activities, respondents most often indicate the lack of educational and material base for practicing the desired sport in their hometown. Before entering the university, 56.7% of students participated only in recreational forms of physical activity. During their studies in high school, male students were mainly interested in football (12.4%), basketball (9.1%) and table tennis (9.2%). Female students were more often involved in cycling (22.8%), roller skating (11.3%), volleyball (8.9%), dancing (18.3%), aerobics (17.4%) and badminton (7.6%). Among active recreational activities, students mostly prefer aerobics and dancing, cycling, jogging in the park, and playing volleyball.

Of the respondents, 33.6% of students are actively involved in sports, of which 20.5% competed in interuniversity student events, and 12.4% participated in competitions at the city and regional levels. The 2 indicator shows statistically significant differences between the sexes: 21.6% of boys and 12.8% of girls play sports.

An analysis of previous experience in sports activities shows that most students began playing sports at the age of 8-9 (12.5%) and at the age of 10-11 (8.7%). The number of classes per week ranged from three to five, training sessions lasted from one to two hours (19.1%) and 2-3 hours (11.6%). However, cessation of sports activities occurs at the age of 13-14 (3.6%), from 15 to 16 years this figure increases to 9.4%, at 17 years 15.7% of young athletes stop playing sports. In general, by the time of entering university, 27.8% of respondents decided to stop playing sports, which shows that by the time of entering university, less than 5.8% of students continue to play sports. Common reasons for stopping active sports activities, according to students, were the inability to combine schoolwork and sports training (8.7%), injuries (7.7%) and an inconvenient training schedule (5.7%) (see table).

An analysis of physical education and sports activities for the current month before the survey shows that 8.7% of students did not participate in any form of physical education. As a rule, among them, there were predominantly students who did not participate in sports during their secondary school studies or who completed sports training at a younger age. Only 21.4% of students participate in sports at least three times a week for at least 30 minutes, 68.7% of students believe that they are not sufficiently involved in physical education and sports activities.

The results of the study indicate the importance of motivating students to participate in physical education and sports activities. Given that students are exposed to a number of social conditions and norms of behavior, higher education institutions have the ability to model a special environment that promotes the formation of a healthy lifestyle through physical education.

The results of the study show that, compared to male students (20.4%), female students (36.1%) prefer recreational forms of physical education and sports activities. As a means of sports activities, male students mainly choose sports games – football, basketball, table tennis. Girls prefer dancing, aerobics,

*Ratio of the percentage of students participating in sports during their studies in high school and at university*

| Sport | Participation percentage | | t | p |
|---|---|---|---|---|
| | In high school | At the university | | |
| Football | 12,4 | 10,6 | 2,2 | < 0,05 |
| Basketball | 9,1 | 10,3 | 4,4 | < 0,05 |
| Table tennis | 9,2 | 8,2 | 3,6 | < 0,05 |
| Cycling | 22,8 | 6,9 | 3,7 | < 0,05 |
| Roller skating | 11,3 | 3,9 | 2,4 | < 0,05 |
| Volleyball | 8,9 | 12,8 | 3,1 | < 0,05 |
| Dancing | 18,3 | 16,4 | 3,5 | < 0,05 |
| Aerobics | 17,4 | 16,8 | 3,7 | < 0,05 |
| Badminton | 7,6 | 5,3 | 4,8 | < 0,05 |

rollerblading and cycling, badminton. Junior students are more active in sports and mass events.

Conclusions. When moving from high school to university, there is a decrease in the number of young people involved in physical education and sports activities. The high percentage of low physical activity of students depends on the socio-cultural environment in which they lived before entering the university. Taking into account individual preferences when organizing sports and mass events is a significant factor in motivating students to participate in physical education and sports activities.

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# Improving social adaptability among students at the University of the State Fire Service of the Ministry of Emergency Situations of Russia through the use of aerobic exercises

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**Abstract**

**Objective of the study** aims to determine the cumulative impact of a competitive team approach combined with aerobic exercise on improving the social adaptability of students with learning difficulties during physical training.

**Methods and structure of the study.** Two groups of cadets from the Saint Petersburg University of the Ministry of Emergency Situations of Russia participated in the study.: There were 25 people in the control group (KG) and the same number in the experimental group (EG). In the control group, physical training classes were conducted according to a standard, approved curriculum. In the experimental group, the same program was used, but using the developed methodology. A new method of aerobic exercise in EG was introduced at the end of the main part of the lesson. It consisted of alternating a three-minute run with exercises from applied gymnastics: push-ups, body lifts from a prone position, a complex strength exercise and leg lifts lying on your back. In the process of pedagogical analysis, the parameters of social adaptation, physical fitness and functional status were evaluated.

**Results and conclusions.** The inclusion of aerobic training using applied gymnastic elements in the program of high-speed movement and athletics classes helps to increase the range of functional capabilities of the trainees. Performing gymnastic exercises in an aerobic format has a positive effect on improving the functional state of the cardiovascular system. The introduction of aerobic training techniques into the educational process helps to develop a mechanism of social adaptation that ensures a balance of mental state in work and interaction among cadets with low academic performance.

***Keywords:*** *adaptation period, phenomenon of social stability, correspondence competitions, aerobic training, team-competitive methodology, mental state of personality, integrated approach.*

**Introduction.** The study of the phenomenon of social stability has neither a sufficiently specific definition nor effective methods for its development. In all the concepts proposed by scientists, a descriptor of this phenomenon based on two positions is not visible: the presence of an influencing factor on the mental state of the individual and the ability to regulate the opposition of the exciting factor [1-4]. Based on this, ignorance of the components and structural connections leads to an ambiguous understanding and the emergence of cognitive dissonance in the study of a social phenomenon.

Social stability is understood as the ability to identify social interaction in life situations and regulate the balance of the mental state in activities and communication.

The purpose of the study is to assess the complex influence of the team-competition methodology and aerobic training on increasing the level of social stability of low-achieving cadets during physical training.

**Methodology and organization of the study.** Two groups of cadets of the St. Petersburg University of the State Fire Service of the Ministry of Emergency Situations of Russia were involved in the survey, the control group (CG) of 25 people, the experimental group (EG) – 25 people. In the CG, training sessions were conducted using the existing methodology, in accordance with the physical training curriculum, in

the EG – according to the existing training program, but using the proposed methodology.

The proposed methodology of aerobic training in the EG was carried out at the end of the main part of the lesson. It alternated three-minute running with exercises from applied gymnastics – flexion and extension of the arms in a prone position, raising the body from a lying position to a sitting position, a complex strength exercise, raising the legs from a supine position [10]. During the pedagogical observation, the indicators of social maturity, functional state and physical fitness were studied (Tables 1-3).

Results of the study and their discussion. No significant differences ($p < 0.05$) in the studied initial indicators were found between the groups, while in the EG the indicators of general endurance in the standards for 3 and 5 km were slightly lower. However, these differences were not significant, which allowed us to put forward the opinion about the same level of initial data (Tables 1, 2, 3).

The study revealed a positive impact of the complex methodology on the social maturity indicators. Thus, reliable changes ($p<0.05$) in the EG occurred in such indicators as communicative skills in interpersonal communication, in comradely mutual assistance, disciplined behavior, and in the indicators of purposefulness in the task at hand and self-confidence and one's abilities, reliable changes ($p<0.01$) are significantly higher.

Overcoming unfavorable factors of physical impact within cadet units, mutual understanding and mutual assistance began to manifest themselves quite stably in relationships. This shows how much the significance of generally accepted goals is reflected in their consciousness, which, in turn, contributes to strengthening comradeship and team cohesion.

In other indicators, positive dynamics were observed compared to the CG. At the same time, positive changes occurred in the functional state of cadets. Thus, reliable changes ($p<0.05$) occurred in the following parameters: frequency of cardiovascular contractions (HR) before the load, HR after the load, recovery time, step test, Stange, Genche tests, maximum oxygen consumption, in other parameters the changes that occurred did not have reliable values, but look much better, compared to the CG.

In this regard, changes occurred in the physical fitness of cadets in the standards for accelerated movement, the results in the 100 m run had a positive dynamics for improvement compared to the CG. Along with this, in the EG, a reliable improvement in the indicators in running for 1 km and 3 km was recorded. In the 5 km cross-country race, positive dynamics were also noted compared to the CG [9].

Along with this, it is necessary to note the change in the HR indicators before the load, which are considered as an increase in the level of social stability. The occurring pre-start excitement is identified with the

Table 1. Changes in social maturity indicators in educational units for the survey period (data were determined on a 9-point scale)

| Name of qualities | Subdivision | Average values of indicators (score) | |
|---|---|---|---|
| | | Before observation | After observation |
| Communicative skills in interpersonal communication | EG | 3,2±0,4 | 4,9±0,2$^{+}$ |
| | CG | 3,4±0,4 | 3,6±0,3 |
| Social activity | EG | 3,4±0,4 | 3,9±0,2 |
| | CG | 3,6±0,3 | 3,8±0,3 |
| Confidence in yourself and your abilities | EG | 3,3±0,4 | 5,1±0,3$^{++}$ |
| | CG | 3,6±0,8 | 3,9±0,6 |
| Purposefulness in the task at hand | EG | 3,2±0,3 | 5,8±0,2$^{++}$ |
| | CG | 3,5±0,5 | 3,7±0,3 |
| Responsibility in assignments | EG | 3,1±0,4 | 4,8±0,3 |
| | CG | 3,2±0,3 | 4,4±0,2 |
| Comradely mutual assistance | EG | 3,4±0,5 | 4,7±0,2$^{+}$ |
| | CG | 3,3±0,4 | 3,7±0,3 |
| Discipline of behavior | EG | 3,5±0,3 | 4,8±0,2$^{+}$ |
| | CG | 3,8±0,4 | 4,1±0,3 |

*Note: Significance of differences: P 0.05+; P 0.01++; P 0.001+++.*

*Table 2. Changes in the indicators of the functional state of the body CG and EG during the period under examination*

| Indicator | Subject group | Average values of indicators | |
|---|---|---|---|
| | | Before observation | After observation |
| Heart rate before exercise (bpm) | CG | 82±3,7 | 80±3,6 |
| | EG | 84±3,9 | 72±3,7+ |
| Heart rate after exercise (bpm) | CG | 112±3,7 | 110±3,6 |
| | EG | 114±3,9 | 102±3,7+ |
| Recovery time (min) | CG | 5,4±0,2 | 5,2±0,1 |
| | EG | 5,6±0,2 | 4,4±0,1+ |
| Respiratory rate at rest (respiratory rates per minute) | CG | 17,2±0,4 | 16,9±0,4 |
| | EG | 17,6±0,4 | 16,8±0,2 |
| Step test (conventional units) | CG | 75,3±0,8 | 82,3±0,5 |
| | EG | 76,4±0,9 | 88,6±0,6+ |
| Stange's test (c) | CG | 59±2,1 | 62±2,1 |
| | EG | 57±3,0 | 75±2,3+ |
| Genchi test, (c) | CG | 54±0,7 | 58±1,3 |
| | EG | 52±0,8 | 62±0,7+ |
| $VO_{2max}$ (ml/min/kg) | CG | 53,0±0,7 | 62,7±0,4 |
| | EG | 52,4±0,6 | 72,8±0,5++ |

*Note: significance of differences: P 0.05+; P 0.01++; P 0.001+++.*

*Table 3. Changes in physical fitness indicators in accelerated movement in groups during the survey period*

| Indicator | Subdivision | Average values | |
|---|---|---|---|
| | | of indicators | After observation |
| 5 km forced march | ЭГ | 24,50±0,32 | 24,25±0,25 |
| | КГ | 24,45±0,32 | 24,35±0,32 |
| Accelerated movement of 3 km | ЭГ | 12,30±0,32 | 11,54±0,25+ |
| | КГ | 12,20±0,32 | 12,10±0,32 |
| Accelerated movement for 1 km | ЭГ | 3,56±0,24 | 3,32±0,22+ |
| | КГ | 3,43±0,23 | 3,39±0,24 |
| 100m run | ЭГ | 14.5±0,O6 | 14.0 ±0,04 |
| | КГ | 14.4±0,06 | 14.2±0,06 |

*Note: significance of differences: P 0.05+; P 0.01++; P 0.001+++.*

performance of training loads and the mechanism of regulation of the mental state, provides a decrease in the HR before performing physical exercises. These data confirm the heart rate after exercise.

When after the active phase of functional performance, the mechanism of regulation of the mental state helps to bring the body to a relatively calm state. However, it should be noted that this effect in the performance of the cardiovascular system, under the influence of the mechanism of regulation of the mental state, occurs with a rational distribution of functional performance, allowing the body to cope with the assigned motor task. This statement is reflected in the step test, in the Stange and Genche tests, in the maximum oxygen consumption [8].

The changes in the functional state that occurred during the period under study show the relevance of the integrated use of correspondence competition methods with aerobic training.

**Conclusions.** Systematic use of aerobic training of gymnastic applied exercises in the process of classes in accelerated movement and track and field allows you to expand the scope of functional abilities of those involved. Performing gymnastic movements in an aero-

bic mode has a positive effect on increasing the level of the functional state of the cardiovascular system. The use of aerobic training methods during classes allows developing a mechanism of social stability that regulates the balance of the mental state in the activities and communication of low-achieving cadets.

The use of the step-by-step method of loading must be accompanied by measurements of blood pressure and heart rate, especially for low-achieving cadets.

To achieve a comprehensive pedagogical impact in microgroups with low-achieving students, use the work of the unit's command link. Check the indicators for accelerated movement and track and field every two weeks.

For a more accurate expert assessment of the indicators of social maturity of cadets, it is necessary to carry out joint work with the unit's command link and the teaching staff. The identified deficiencies in the behavior of cadets must be discussed in the form of pedagogical instructions.

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# Coverage of a large-scale sporting event in an era of disparate values: an analysis of the opening ceremony of the 2024 Olympics

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**Abstract**

**Objective of the study** is to identify the key content characteristics of media accompaniment related to the general tone and theme of the ceremony's assessments.

**Methods and structure of the study.** The article contains a theoretical overview summarizing the research results of foreign scientists. These studies have revealed different and even contradictory audience responses in different countries. The empirical part of the work is devoted to the analysis of media coverage of the opening ceremony in the Russian information field.

**Results and conclusions.** The analysis revealed four groups of critical comments regarding the sports event in question. Unlike the previous opening ceremonies, the fourth category of negative reviews, which has an axiological and political character, stood out clearly. These assessments are caused by the desire of France, as the organizer of the 2024 Olympic Games, to link the universal ideals of Olympism with a global neoliberal and ideologically biased program. Some of the symbols, images and narratives presented at the Paris opening ceremony come into direct conflict with the principles of the Olympic movement and serve the function of separation rather than unification in public policy.

***Keywords:*** *sports event, Olympism, mediatization, philosophy of the Olympic movement, values of sport and Olympism, risks of forming a value split.*

**Introduction.** Sport has a powerful consolidation potential: it involves and thereby unites, through its principles and on its platforms, people with different beliefs, education, religious views, economic status, etc. The Olympic movement and the values of Olympism are an example of just such a positive non-political, but value-based consolidation, which allows for the formation of a basis for inter-country cooperation and intercultural dialogue. On the other hand, as A.O. Naumov notes, the mass character and popularity of the sports movement turns it into an effective tool for popularizing the political and economic system, prevailing values, and justifying the state's foreign policy [1].

In this case, consolidation can be replaced by indoctrination of specific ideological narratives. This leads to a confrontation no longer between athletes (which corresponds to the principles and values of Olympism), but between the states, value systems, ideological models, etc. that stand behind them [6].

In the scientific discourse, we see examples of attempts to transform universal Olympic values: for example, the position of D. Saini [8], according to which the Olympic Games promote such social goals as gender equality, environmental protection and inclusiveness, seems controversial. In our opinion, the listed values are not directly related to sports and the philosophy of the Olympic movement and do not have a conventional (generally accepted) interpretation, and in the ideological framework of neoliberalism they often take radicalized forms.

From the point of view of event management, the opening ceremony of the Olympics can be understood as a specially organized event (event) with dual functionality [5, 10]. It represents the values of sports and Olympism, and also contributes to the image promotion of the host country, which has undertaken the obligations to organize and hold the competitions. In accordance with the Olympic Charter (2024, paragraph 55), the programs of

the ceremonies are checked and approved by the IOC, including for compliance of the presented subjects and concepts with the spirit of Olympism and Olympic values.

The opening ceremony includes both traditional symbols (flags, Olympic rings, Olympic flame, parade of athletes, etc.) and nationally specific ones, referring to the culture and image of the host country. The combination of these symbolic elements can be built in different ways, depending on the goals of the organizers. A situation is possible when the hierarchy of these symbolic elements levels out the values of Olympism. In our view, this is exactly what happened at the Paris opening ceremony, which combined a traditional concept with a radical neoliberal agenda (including inclusive and transgender issues, as well as a disrespectful attitude towards religious values), which was perceived by many groups in the public as a challenge to traditional values [9].

**Objective of the study** is to identify the key substantive characteristics of media coverage associated with the overall tone and theme of the ceremony assessments.

Methods and structure of the study. As the researchers note, the opening ceremony, which took place in Paris on July 26, 2024, caused sharply negative emotions, even disgust, in many countries [2, 3, 7]. The Olympic Games are a social phenomenon of a high degree of mediatization. Here we mean mediatization as the mediation of social practice by media technologies and media logic in accordance with the approach of Couldry, Hepp [4]. Obviously, the overwhelming majority of viewers, unable to attend the games in person, see the Olympics as represented by the mass media, through broadcasts, reports, news, and social networks.

Analysis of the communication message of this ceremony, as well as its media display in the Russian information space, is the subject of our study. In doing so, we will rely on both the methodological foundations of the sociology of sport and the general theory of public communications and public relations.

To identify the accents of media coverage of the opening ceremony of the 2024 Olympic Games, we turned to the corpus of media texts published in the Russian information space on July 26-28, 2024.

The empirical base consisted of publications for the specified period, posted in social media, social networks, electronic versions of federal newspapers, collected by the Semanticforce.net system using the keyword "Olympics 2024". Next, a manual selection of materials dedicated to the opening ceremony was made, and their content was processed.

The hypothesis was that the Russian media discourse that formed around the opening ceremony of the Paris Olympics would actively represent negative assessments associated primarily with the value-based content of the generalized message addressed to the global audience, which is not in line with the spirit of Olympism, and is fundamentally Atlantic-liberal.

We will not reproduce in detail the stories shown to the audience of the ceremony in this article. Recordings of the ceremony are available online, and brief content has been described in a number of scientific publications. Thus, we will cite a quote from the work of Miller B. “Crisis at the Summer Games: How Organizers Responded to Controversy at the Paris 2024 Olympics”: “The ceremony featured transvestites and universal love was promoted, and at the culmination of the ceremony, a short song was performed by a man painted blue from head to toe, in imitation of the Greek god of wine Dionysus. Because he sang in support of the opposition to the war, some members of the Christian community claimed that the scene was a deliberate mockery of Leonardo da Vinci's painting The Last Supper, which depicts a key moment before the crucifixion of Jesus Christ, as described in the New Testament." [7] We believe that even from this brief description it is clear that the messages being conveyed had little to do with the ideals of Olympism, but they clearly challenged and even mocked traditional values.

**Results and conclusions.** It is important to note that Russia was excluded from participation in the games and media coverage of the 2024 Olympic Games in the Russian media space was characterized by a number of circumstances: the ceremonies were not broadcast by state media, while individual elements of the ceremony contained references to ideological narratives prohibited by the legislation of the Russian Federation. This imposed certain restrictions on the coverage of this event in the Russian information space and determined the relatively low number of publications devoted directly to the opening ceremony. The basis of the sample of media texts was materials with an overview and assessment of the ceremony, published in the media, reviews and comments from popular bloggers, as well as secondary materials in social media, the informational reason for which were the same comments from famous bloggers, politicians, athletes. Among the sources of evaluative information cited in the media, only 14% gave a positive assessment of the ceremony. The remaining speakers conveyed a pronounced negative reaction, including the use of expressive lexemes: "hellish bad taste", "the most acute crisis", "the era of cringe multiplied by trash", "the degradation of world Olympism".

Journalistic materials contained a large number of negative assessments of the French organizers, which

can be grouped into the following categories: 1) conditionally objective circumstances (weather conditions, water quality in the Seine);

2) technical errors of the organization (the inverted flag of the Olympic Games, the incorrect announcement of the South Korean team, shortcomings in the filming process);

3) the artistic and aesthetic concept of the ceremony (from the choice of plots and locations to the costumes of the participants);

4) ambiguous ideological narratives that do not correspond to the values of Olympism (a parody of the Last Supper, the promotion of the neoliberal agenda).

It should be understood that the first three categories of negative information reasons are typical for a mediatized sports event of this level and scale. The organization of any special event is accompanied by risks and miscalculations of this kind. And given the intercountry competition, negative publications highlighting organizational blunders are almost inevitable.

The interpretation of the artistic and aesthetic component is of a taste nature and can become a subject of discussion; as a rule, aesthetic concepts collide here. But a discussion in this substantive field attracts attention and rather provides additional opportunities for mediatization, ensuring a more stable position of the mediatized event in the information agenda.

As for the fourth category of negative assessments, it has a special nature. Both value and political. And therefore deserves special attention. The conscious actualization of the value conflict inevitably provokes negative reactions in an acute form. This closes the mediatized event from the audience: both literally (for example, the refusal of broadcasters to buy broadcast rights) and figuratively (activation of internal resistance in the audience that adheres to other value systems). And as our analysis has shown, it is this component that has taken an important position in the assessments of the opening ceremony of the 2024 Olympic Games in the Russian media discourse. And this is understandable, since the values that are not simply broadcast, but aggressively imposed at this ceremony, directly contradict not only the traditional values of the multinational and multi-confessional Russian people, but also the classical international values of the Olympic movement.

**Conclusions.** Ultimately, with the aesthetics and meanings broadcast during the opening ceremony, France and Paris promoted themselves not as the capital of Olympic ideals, where athletes achieve victory in a fair sporting competition, but as a herald and propagandist of the global neoliberal Euro-Atlantic agenda. And thus, they did a disservice not only to themselves, but also to the entire Olympic movement. The audience of many countries, including Russia, considered this message, and they did not like it.

Mixing the values of sport and Olympism with a certain ideology carries serious risks of forming value splits and exacerbating value contradictions. Moreover, the neoliberal agenda itself does not at all correspond to the criteria of universality and generality, and is actively criticized, including in the West. In general, such practices harm the authority of international sports institutions and discredit high-performance sports.

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# Possible trends in modern Russian philosophy and social science of physical culture and sports

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**Abstract**

**Objective of the study** is to highlight and discuss the probabilistic trends in modern Russian social philosophy and the science of FKiS, starting in the 90s of the XX century. laid by the next wave of "Eurocentrism" and "Westernization" of the domestic information space.

**Methods and structure of the study.** The study is designed as a systematic comparison of generally accepted and innovative scientific approaches in the fields of philosophy, social and cultural anthropology, history, political economy, political science, sociology, psychology and pedagogy of physical culture and sports.

**Results and conclusions.** The current state of Russian philosophy of physical culture and Sport (FKiS), as well as related social sciences, is characterized by sustained conservatism, insufficient preparedness and adaptation to a number of significant changes. This concerns the transition of Russian society to a capitalist model of development, the increasing informational impact of Western (European and American) scientific, educational and cultural trends, the aggravation of the international situation and foreign policy contradictions, as well as the transformation of the role and social significance of elite and Olympic sports in modern reality. Due to the objectivity and inevitability of historical progress, there is an urgent need for an urgent and fundamental restructuring of philosophy and social sciences studying the FKiS. This is necessary to ensure their compliance with modern socio-cultural challenges and the ability to adequately understand and cover them.

***Keywords:*** *modern Russian philosophy, modern Russian social science, probabilistic trends of change, philosophy, science, education.*

**Introduction.** It is known that the first publications on the philosophy of physical education and sport (hereinafter referred to as PES) began to appear in the 1920s. In this regard, it becomes obvious that specialized philosophy is already about 100 years old [6, 7, 11-14]. At the same time, the significant diversity of philosophical doctrines of the 19th–20th centuries leads to the conclusion about the initial heterogeneity of the philosophical foundations of social sports science. This heterogeneity quite naturally influenced the theory and methodology of the social sciences of PES themselves, providing them with multidirectional development vectors [4, 5].

The heterogeneity and multidirectionality of the social sciences of PES, on the one hand, were further proof of the falsity of a purely cumulative model of growth and accumulation of scientific knowledge, on the other hand, gave rise to a mass of discrepancies and paradoxes that are extremely harmful and dangerous from the standpoint of the principles of scientific unambiguity and consistency. Recognizing the undoubted fact of heterogeneity of the profile social science, specialists began to talk about history, pedagogy, sociology and psychology of physical culture and sport not just as sciences, but as disciplines filled with disagreements and internal contradictions, as eclectic conglomerates, in addition to science, including elements of mythology, ideology, art [1, 2, 6, 7, 10-14].

However, this heterogeneity also has a common character and features determined by belonging to

the Eurocentric and American sociocultural programs. These programs have been washing over Russian science, education, and culture in waves for the last century and a half, largely suppressing elements of originality and national identification, leaving Russian scientists at the "tail" of the world development of science. Therefore, the relevance of the proposed material, taking into account the assertion about the initial heterogeneity of domestic specialized philosophy and social science, is determined by the problem of their traditional commitment to foreign borrowings – commitment, once again confirmed by the facts of mass philosophical and social scientific borrowings in the period from the mid-90s of the 20th century to the present.

**Objective of the study** is to highlight and discuss the probabilistic trends in the change of modern domestic social philosophy and science of physical culture and social science, starting from the 90s of the 20th century, laid down by the next wave of "Eurocentrism" and "Westernization" of the domestic information space, including specialized philosophy, science, and education.

Methodology and organization of research. The scientific work is organized in the form of a consistent comparative analysis of traditional and innovative scientific concepts in the field of philosophy, social and cultural anthropology, history, political economy, political science, sociology, psychology and pedagogy of physical education and sports [7-8, 10-14]. The object of the analysis is foreign philosophical and social scientific borrowings, and the subject is the most probable trends of their dissemination to the sphere of philosophy and social science of physical education and sports. The hypothesis of the study consists in a preliminary scientifically substantiated assumption that the most promising trends of transferring the said borrowings to the sphere of physical education and sports have a fairly high probability, since they are based on the natural and largely inevitable nature of the development of this process.

**Results of the study and their discussion.** Philosophy of Physical Education and Sports. The main array of traditional areas of philosophical research in the field of Physical Education and Sports, for example, presented in the Anthology of Philosophy of Sport by Klaus Meyer and William Morgan [6, 14], or in the Reader edited by V.I. Stolyarov [11-13], is clear evidence of the great diversity and mixture of philosophical and sociological concepts of Physical Education and Sports. However, even this array cannot take into account the full range and depth of philosophical and social problems of the existence of a specialized sphere in the conditions of the modern information society with its high rates of development of digital culture, which, in turn, greatly affects the nature and direction of development of modern sports [2, 3, 6-8]. The modern conflict confrontation between Russia and Europe also requires a significant adjustment of philosophical ideas about the humanistic, non-political, peacekeeping role of sport in the modern international process [1, 5, 10-13].

A new philosophical understanding requires a significant correction of the ancient and modern history of Olympism [7, 12, 13], partly unconsciously and partly quite consciously mythologically manipulated by apologists of the Western European model of the Olympic tradition [2, 5, 7, 12, 13].

In general, a thorough work should be done with the philosophical understanding of sport as an ancient and modern social institution, taking into account its religious and political roots and modern market-oligopolistic, corrupt-bureaucratic realities [1-3, 7, 10-13].

***Anthropology of Physical Culture and Sport.*** Sport is not the only component of the Physical Culture and Sport sphere. Physical culture, physical and military-physical education also have high social significance and an objective historical role in the development of society, which is especially relevant in the modern period of politicization and institutionalization of sports [1, 3, 4, 5, 7]. Now that society has entered a period of global crisis, it is necessary to point out the significant difference between sports, physical culture, military-physical education [1, 4, 5, 7].

It would also be worthwhile to consider that in addition to philosophical anthropology and cultural studies of sport, social and cultural anthropology has long existed and is actively developing [2, 7, 8, 16, 18]. This relatively young science includes many areas that can "shed light" on the real and concrete social identification and specificity of various forms and types of physical culture and physical education, different tribes, peoples, nations [8]. Which, in turn, will significantly undermine the absolutism of ideas about sport as a global phenomenon in the era of globalization.

***Sociology of Physical Culture and Sport.*** Some experts have already rightly noted that the sociology of sport, firstly, is mixed with the philosophy and cultural studies of sport [7, 9-14], and secondly, it is develop-

ing in parallel and in significant isolation from the main directions of modern world sociology, which is largely due to the absence of international and domestic associations, unions and journals with a pure physical education and sports orientation [9].

In pursuit of the constitution of its own scientific discipline, the sociology of physical education and sport has largely lost its connection with sociology as a science, having blocked its own opportunity to feed on the latest sociological theories and concepts with its own traditionalism and conservatism.

***Psychology of Physical Education and Sport.*** A similar situation of parallelism and lag has developed in the psychology of physical education and sport, which often comes into conflict not only with modern psychology, but also with sports pedagogy, and even with the theory and methodology of sport [4, 18].

Domestic psychology of physical education and sport has not yet fully realized the importance and irreversibility of modern trends in the radical convergence of biology, applied and psychological anthropology, social psychology with the real prospect of the formation of biosocial psychology as a new scientific discipline [8].

**Conclusions.** Traditional Russian philosophy of physical education and sport and social sciences of physical education and sport as a whole still demonstrate conservatism, unpreparedness and unadaptability to the transition of Russian society to the principles of capitalist formation development (without comments on the assessment of this transition), to the next wave of information influence from Eurocentric and American scientific, educational, cultural borrowings, to the situation of acute (partially military) confrontation of Russia in the foreign policy arena, to the change in the role and social significance of the highest achievements and Olympic sports in modern conditions. The objectivity and irreversibility of the historical process raises the question of an immediate and significant restructuring of the philosophy and social sciences of physical education and sport in order to remain at the height of correct understanding and coverage of modern socio-cultural challenges.

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