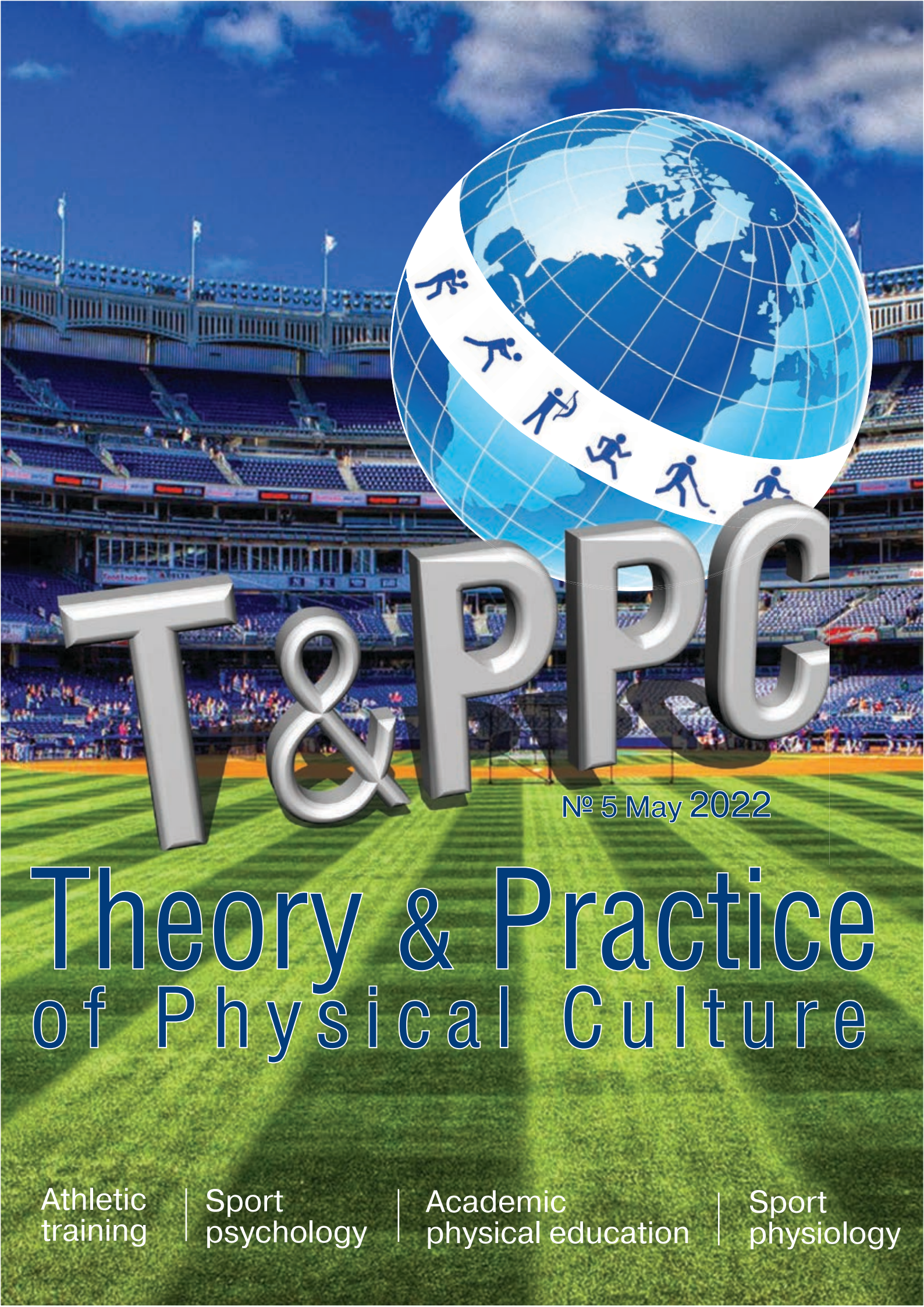

T&PPC

№ 5 May 2022

Theory & Practice of Physical Culture

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

Key issues of the modern sports science for discussion

The phenomenon of competitiveness in the cultural understanding of modern sports

At present, almost before the eyes of one generation, sport has grown from a marginal activity of amateur athletes into a powerful show business industry. Sports in terms of the number of spectators has become the undisputed leader of the mass entertainment culture of modern society. A sports spectacle creates a new aesthetic perception, evokes a lot of different emotions in the viewer, fueling interest in bookmaker bets.

It is known that a competition is, first of all, a rivalry organized according to pre-formed rules, during which the actions of participants with approximately the same level of preparedness are unified; the conditions for their implementation and evaluation are carried out according to the established regulations. For competitive activity, a pronounced focus is to achieve the highest result in the conditions of confrontation, wrestling, duel, game rivalry, which allows you to identify and compare the abilities of the competitors, thereby contributing to their further development and improvement. Thus, the mechanism of the transition from competitive to human-creative and creative activity becomes clear, as a convincing translation of the cultural content of sports.

The high level of athlete's claims can explain the distinctive features of sports training from general physical training: target orientation, tasks, composition of means and methods, structure of training stages and cycles, complex control and management system.

In the process of preparing for competitions, striving for the highest achievements provides for the athlete's consistent actions to overcome the achieved level of his abilities. At the same time, it is important to find the line between the optimal construction of the training process, focused on achieving the maximum effect, as opposed to forced training, aimed at achieving the immediate goal, usually achieved to the detriment of the athlete's health and the premature end of his sports career.

Competitive activity also implements socio-cultural functions: it creates conditions for the self-realization of those involved, activating the internal potential of the athlete and contributing to the formation of such personal qualities as discipline, will, independence. The phenomenon of competitiveness creates the prerequisites for the development of the cognitive activity of an athlete, the manifestation of creativity and creativity in the organization of the training process, promotes the socialization of athletes, involves them in interpersonal interaction, communication in the prevention of bad habits.

Consideration of competitiveness in the context of philosophical approaches shows that the self-determination of a person in sports means, in fact, the definition of "Self" in relation to the "Other" in comparison of "I" - "Other", which is present in all spheres of human existence. However, it is in sports that it is most clearly expressed, in essence, it reveals the understanding of this relationship: who is the “I” in comparison with the “Other”? Thus, the subjectivity of competitive activity is determined: the identification of a social model-ideal that is important for another. At the same time, the subject, realizing his own goals and interests in the conditions of the competition, can be considered as a unique personality involved in the sports community.

Sport in its current form determines the disagreement of theorists and experts regarding its definition in relation to physical culture. In our opinion, today the problem of the development of sports culture, the effective formation of which is possible in the conditions of competitive activity, is relevant for substantiating the socio-cultural function of sports. At the same time, "big" sport is moving away from culture, demonstrating the ultimate human ability to achieve records using the most repressive methods of sports training for athletes. Sport, which has become a sphere of spectacle and entertainment for non-sporting audiences, sexual sublimation, support for the political ambitions of rulers, business structures, distorts the essence and cultural meaning of competitive activity.

We invite scientists to publish articles that are aimed at finding new approaches in the development of the Olympic movement and large-scale sports events.

Chief Editor of TiPFC,
Honored Worker of Physical Culture of the Russian Federation,
doctor of pedagogical sciences, professor L.I. Lubysheva

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Theory and Practice of Physical Culture

Contents

Benefits of active inference method for training process analysis in elite alpine skiing sport

UDC 573.2+ 796.926

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Abstract

Objective of the study was to theoretically analyze and test benefits of an active inference method for training process in elite alpine skiing sport.

Methods and structure of the study. We sampled for the active inference method testing experiment national alpine skiers (n=20, equal gender split), qualifiers for the World Cup and tested their training progress by a) Stabilan-01 stabilometric test system with a biological feedback capacity, b) dopamine levels.

Results and conclusion. Dopamine levels in blood served as an indicator of changes in the athletes' movement control system; these changes were related to execution of different training loads. We registered a decrease in prediction errors after the 21-day long training period aimed at technique adjustment, if compared to the other 21-day long training period aimed at improvement of physical capacities. As provided by the modern theory of active inference, these progresses are largely due to improvements in the somatosensory prediction of the movement results system performance and, as a result, progress forecasts depending on the somatomotor system state.

Keywords: *Alpine skiing, tracking moves, active inference, motor control.*

Background. Modern movement control studies apply a few theoretical concepts based on the idea of that the central nervous system develops certain internal models for efficiency [8]. These internal models are a interpreted by a theoretical hypothesis of the informational exchanges between the somatomotor and somatosensory systems that largely contribute to the computational capacity of the nervous system and help master and excel every highly coordinated movement. It is traditional to classify these internal models into the direct and inverse ones with the relevant motor system dynamics [8]. In a movement process, the direct model forecasts states of the motor apparatus with the relevant sensory stimuli at every time point, whilst the inverse model designs the movement execution program. In other words, the inverse model transmits a motor control command, whilst the direct model converts an efferent copy of the motor control command into sensory forecasts [12] to optimize the target state of the motor system as programmed by the inverse model.

It was in the late XX century that the research community started applying the Bayesian decision-making (optimal behavior) theory with the relevant mathematical statistics tools to develop a range of perceptual processing and sensory-motor control models [9].

Active inference in this context may be defined as the control model under the Bayes theory [2] or the forecast error minimizing approach.

The core idea of the model provides for the work of the cognitive system to minimize errors in prediction using motor activity (movements) in such a way that the sensory input best corresponds to the predictions of the model [7]. In the theory of active inference, it is argued that descending signals are predictions of the sensory consequences of movement. Descending signals determine sensory trajectories, the fixed point of which is the equilibrium point; i.e., the dynamics of movement (including speed, acceleration, jerks, etc. d.), and not only the position and torque at the end point [5]. In the active

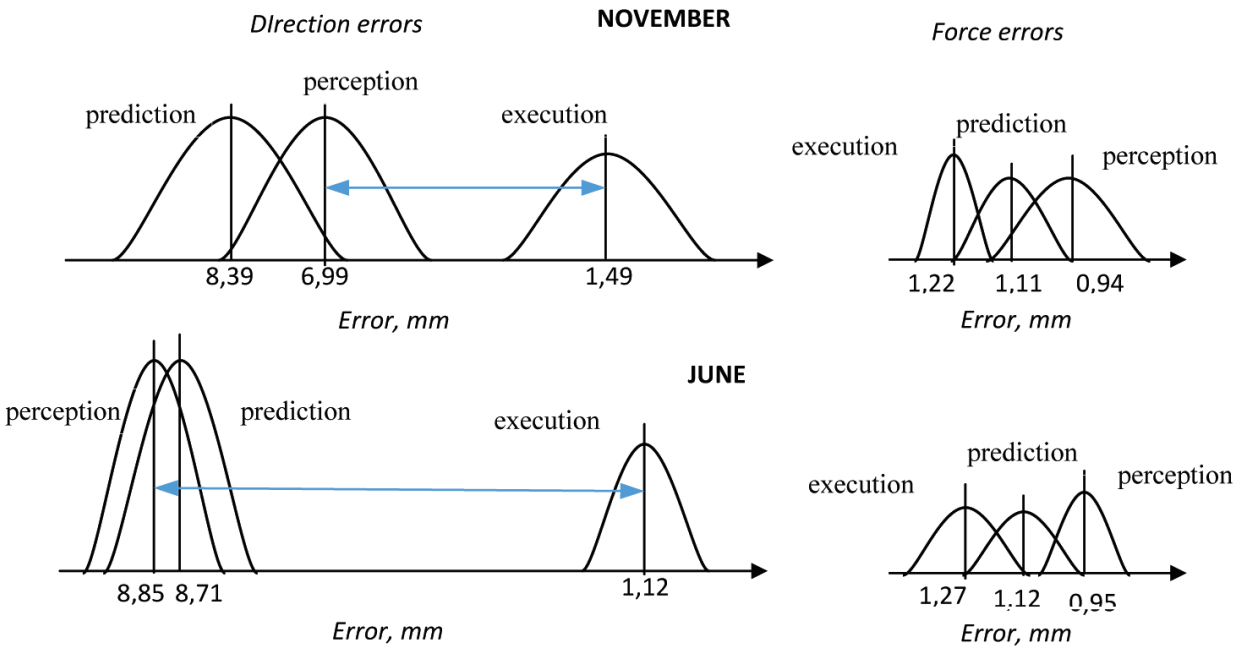
inference model the mechanical cost functions are replaced by the person's ideas of the desired movement trajectories in external frames of reference. The active inference transforms the desired (expected) motion paths in external coordinates into motor tasks in internal coordinates. In this case, the inverse task, which is to cause excitation in a certain stretch receptor and contract the corresponding muscle fiber, is transferred to the spinal level [6]. Numerous studies of dopamine show its involvement in the movement control process [1]. Dopamine plays a key role in active inference. In recent works, the effects of the dopamine neurotransmitter are shown as one of the possible neural accuracy encoding mechanisms. Greater precision (no matter how it is encoded) means less uncertainty. Uncertainty can be encoded by the same postsynaptic neuronal enhancement that is modulated by dopamine meaning that changing the dopamine level alters the level of uncertainty about different representations. Physiologically, this is a process of short-latency surges of dopamine in the basal ganglia that occur after any significant event, beneficial or not.

Objective of the study was to theoretically analyze and test benefits of an active inference method for training process in elite alpine skiing sport.

Methods and structure of the study. National Alpine skiers (n=20, equal gender split), qualifiers for the World Cup finals, were subject to experiment and tested monthly from April to November and their training progress was recorded on a daily basis by Stabilan-01 stabilometric test system with a biological feedback capacity (Rhythm, Taganrog) [10]. The testing procedure was to curvilinear motion of the body in the ankle joints at a speed of 30 mm/s, called "Evolvent", which was displayed on the monitor screen as a cursor. The subject had to hold the marker of the common center of pressure (COP) as close as possible to the marker that sets the circular trajectory. The speed and deviation of the COP trajectory from the template were recorded.

Based on numerical simulation using the Kalman filter methods or Linear-QuadraticEstimator, and Linear-QuadraticRegulator, a numerical assessment of the contribution of the components of motor errors was made: xplan planning, estimated (i.e., the athlete's feelings based on previous experience) xperf and performed xtarg movement, deviation from the template in direction a and force n [11]. The athletes also had their blood tested to reveal the quantitative dopamine level. The method of high performance liquid chromatography was used in combination with tandem mass spectrometry (HPLC–MS/MS) [3]. The integration of chromatographic peaks was carried out automatically using LabSolutions software version 5.97.

Results and discussion. Two months with the maximum (November, state B) and minimum (June, state A) ($p<0.01$) dopamine levels in the athletes were selected for analysis (Table 1). The nature of



Errors associated with movement direction and applied forces during test procedure

Table 1. *The results of the stabilometric test "Evolvent"*

State	Dopamine, ng/ml	V, mm/c	SummErrX, mm	SummErrY, mm	MidErrX, mm	MidErrY, mm	KorrCount
B, November	26,46±5,20	30,24±3,84	25667,1±6239,7	25180,6±4869,9	5,68±1,38	5,57±1,07	192±41,19
A, June	88,87±22,58	29,50±3,17	24393,6±4504,9	23861,4±4412,3	5,39±0,99	5,28±0,97	185±48,24
Difference, %	-29,77*	2,45	4,97	5,24	5,11	5,21	3,78

Note: V, mm/s – velocity of displacement of COP, SummErrX – total error in the frontal plane; SummErrY – total error in the sagittal plane; KorrCount – number of corrections. A – state of athletes subject to testing in November, B – in June.

the training loads in these months is fundamentally difference in the use of strength-building and technical exercises. In June, athletes performed maximum muscle strength building sessions using exercises that lead to a change in the muscle structure, aimed at increasing the volume of myofibrils and increasing the myofibril density in the muscle fiber. The exercises close in structure to competitive ones were lacking during this period. In November, the athletes performed a lot of technical, complex coordination work, and strength training was geared to maintain the strength level using explosive strength and maximum strength building methods in the modes similar in structure to schussing. Technical trainings performed on the mountain amounted to 9% of the maximum recorded throughout the season

In June, the lower test performance speed and longer COP distance were recorded. In November, the speed of movement, on the contrary, exceeds the required speed of movement, and the distance is shorter. As for the error in performing the tracking movement, the total and average errors in the frontal and sagittal planes are bigger in November rather than in June, but in both cases the error values are within the norm [10].

Figure 1 shows the results of the values of motor control errors of various nature. In November, the prediction error, i.e. the difference in the values between the actual performance and the prediction (benchmark) decreases compared to June. The spread in values in the prediction can characterize the amount of uncertainty, which is higher in November than in June. The spread in these errors when movements are performed corresponds to the amount of interference that prevails in November. A significant data shift in how athletes feel is noted in this month.

The decrease in this kind of errors and the approximation of the data to the real performance is probably associated with the process of training athletes to control in variable external conditions. But this, in both cases, occurs with the spatial characteristics of tracking motions, but not strength ones. In all cases, the x^{plan} prediction error rates remain unchanged. In November, the x^{perf} sensation error corresponds more to the actual movement execution, i.e. the difference between x^{perf} and x^{targ} (actual) is less. In June, the prediction error is somewhat less consistent with the actual movement, and the of perception x^{perf} feel values are further from the real x^{targ}.

Thus, active inference can minimize prediction errors by predicting the motion path. In our data, this is clearly seen in changes in the errors associated with the trajectory, since power manifestations remain practically unchanged. This is especially interesting from the point of view of comparing the training work performed by the athletes in June (general preparatory stage) and November (preseason). The difference at these stages is in the biomechanical specificity of the performed exercises compared to competitive movements. In June, exercises with non-specific movements were performed and geared to increase the muscles functionality in the athletes.

Accordingly, the receptor date from the neuromuscular spindles and Golgi tendon organs was dominant in the control of movements, the athletes' consciousness was focused on feeling of the amount of the applied efforts and, accordingly, was associated with the internal coordinate system. Control information is associated with changes in the neuromuscular system and the control system solves the problem of balancing internal ascending and descending information flows, which leads to an increase in the load on the basal nuclei and an increase in blood dopamine in the athletes. In November, a significant number of descents was used.

To perform exercises focus should be made on obtaining extraceptive information about the place of the athlete in the surrounding world and conditions in which he moves, which determines the visual system leading, information from which forms the basis of the external control model. The specificity of the control model and sensory information are extremely consistent with each other, which reduces

errors in predicting the path of the skiing movement being performed, so surprises are less likely [5]. In this case, the load on the basal ganglia is lower, which leads to a decrease in blood dopamine in the athletes. In active inference, this corresponds to predictions based on the accuracy of the sensory input, and optimizing the postsynaptic amplification of prediction error units. The process of forming the second type of prediction is slower in time than the process of the first type, in which neuromodulators are used, including dopamine, and not a quick switch on - switch off of the data transfer [4].

Conclusion. The use of the theory of active inference made it possible to interpret in a new way the influence of different, in essence, training influences on the organization of movement control. The fundamental difference is in the transition to assessing the probability of sensory information when performing voluntary movements, instead of the traditional performance assessment.

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Component composition of the body of armrestlers of various level of preparedness

UDC 796.89

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Abstract

Objective of the study was to identify the features of the somatotype of athletes - armwrestlers of various qualifications.

Methods and structure of the study. The experiment was carried out during the preparation of athletes for the All-Russian competitions in arm wrestling among students at the Belgorod State National Research University. The study involved 30 athletes of various qualifications involved in arm wrestling. Respondents were conditionally divided into two groups: qualified athletes with the category of Candidate Master of Sports (CMS) and above (n=15), and athletes of mass categories and without categories (n=15). Fat mass, percentage of fat mass relative to total weight, percentage of active cell mass and skeletal muscle mass relative to lean mass, as well as the somatotype of athletes were determined. To determine the somatotype, a 7-point Sheldon rating scale was used.

Results and conclusions. As a result of the study of the somatotypes of athletes involved in arm wrestling at the level of mass sports categories, the dominant type of mesomorphy was revealed. The most preferred body type for the effectiveness of the competitive activity of qualified armwrestlers of medium and heavy weight categories (80 kg and more) is endo-mesomorphic. Athletes with a wide range of relative values of body fat mass can demonstrate high sports achievements in arm wrestling.

Keywords: *arm wrestling, bioimpedance analysis, body composition, somatotype, body fat mass.*

Introduction. Body composition, or somatotype, is currently considered an integral criterion of physical development. Its assessment is carried out according to the ratio of the main components (muscle, fat and bone tissue).

A somatotype is a constitutional body type of a person, but it is not only the body itself, but also a program for its future physical development [1].

The size and shape of the body of each person is genetically programmed. This hereditary program is realized in the course of ontogeny, i.e., in the course of successive morphological, physiological, and biochemical transformations of the organism from its inception to the end of life [3].

The physique of a person changes throughout his life, while the somatotype is genetically determined and is his constant characteristic from birth to death. Age-related changes, various diseases, increased physical activity change the size, shape of the body, but not the somatotype.

M. Dopsai and co-authors, studying elite athletes, came to the conclusion that body composition is one of the main predictors of the success of competitive activity. The authors confirmed that the bioimpedance method has a great informative significance and reliability [2].

Objective of the study was to identify the features of the somatotype of athletes - armwrestlers of various qualifications.

Methods and structure of the study. The experiment was carried out during the preparation of athletes for the All-Russian competitions in arm wrestling among students at the Belgorod State National Research University (Belgorod). It was attended by 30 athletes of various qualifications engaged in arm wrestling. Of these, one Honored Master of Sports of

The results of the study of somatotype and body fat mass in highly qualified athletes

Name	Body weight, kg	Fat mass, %	ENDO	MESO	ECTO	Somatotype	Rank
Timur M.	93	23,2	4,74	7	0,66	Endo-mesomorphic	Honored Master of Sports
David Sh.	113	14,3	3,87	9.53	0,10	Endo-mesomorphic	Master of Sports
Maxim P.	112	25,6	5,17	7,17	0,33	Endo-mesomorphic	Master of Sports
Michael B.	87	18,4	2,88	5.05	2,31	Endo-mesomorphic	Master of Sports
Michael V.	85	14,2	3,12	6,86	1,11	Endo-mesomorphic	Master of Sports
Michael K.	90	13,4	2,50	6,12	1,64	Endo-mesomorphic	Master of Sports
Nikita M.	92	17,4	5,34	10,27	0,10	Endo-mesomorphic	Master of Sports
Rustam A.	80	15,5	3,93	7,77	0,64	Endo-mesomorphic	Master of Sports

Russia, eight Masters of Sports, six candidates for the Master of Sports, 11 athletes of I-III categories, four without a category. Respondents were conditionally divided into two groups: qualified athletes with CCM category and above (n=15), and athletes of mass categories and without categories (n=15).

The study was performed using a bioimpedancemeter MEDASS ABC-02. The fat mass, the percentage of fat mass relative to the total weight, as well as the somatotype of the athletes were determined. To determine the somatotype, a seven-point Sheldon rating scale was used.

Results of the study and their discussion. Visualization of the data obtained in the study of somatotypes of armwrestlers of mass sports categories and athletes without categories is presented in the form of a two-dimensional model of Sheldon's triangle in fig. one.

Athletes are in the upper part of the Sheldon's triangle, which indicates the dominant type of mesomorphy. Three respondents are outside the Sheldon's triangle, this is due to the fact that these athletes have an endomorphic indicator much higher than an ectomorphic indicator. Twelve athletes are within the triangle, as the obtained indicators are within the limits of the classification chosen for the study. The indicators of athletes are located in relative proximity, this fact indicates a slight variation in the data obtained.

Visualization of the data obtained in the study of somatotypes of arm wrestlers of a high level of preparedness is presented in the form of a two-dimensional model of Sheldon's triangle in fig. 2.

Athletes are at the top of the Sheldon's triangle, indicating a dominant mesomorphic score. Seven subjects are outside the triangle, which indicates

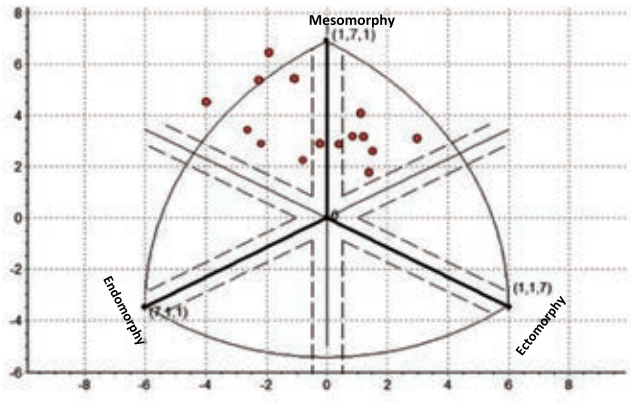

Figure 1. *Graphical distribution of armwrestlers of mass discharges in Sheldon's triangle*

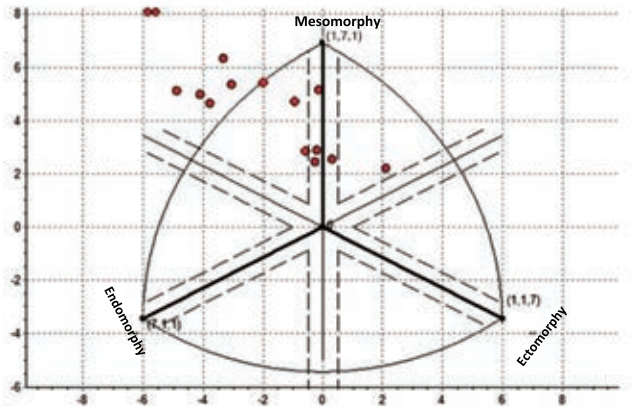

Figure 2. *Graphical distribution of qualified athletes - arm wrestlers in the Sheldon triangle*

a strong excess of the norm in terms of endo and mesomorphy.

Let us dwell in more detail on the results of measuring the somatotype of qualified armwrestlers (masters of sports of Russia and above, n=8). It was found that all examined highly qualified athletes had an endo-mesomorphic somatotype. At the same time, all respondents belonged to medium and heavy weight categories - 80 kg and above. A wide range of indicators of the proportion of body fat mass was revealed. The percentage indicators of the fat mass of armwrestlers vary according to the specifics of the weight categories in which the athletes perform (see table).

Conclusions. As a result of the study of the somatotypes of athletes involved in arm wrestling at the level of mass sports categories, the dominant type of mesomorphy was revealed. The most preferred body type for the effectiveness of the competitive activity of qualified armwrestlers of medium and heavy weight categories (80 kg and more) is endo-mesomorphic. Athletes with a wide range of relative values of body fat mass can demonstrate high sports achievements in arm wrestling.

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Individual-integral assessment of preparedness and potential capabilities of a sports reserve in Nordic combined

UDC 796.925

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Abstract

Objective of the study was to to develop a methodology for individual-integral assessment of readiness and determination of the potential capabilities of a sports reserve in Nordic combined.

Results and conclusions. The developed methodology for individual-integral assessment of preparedness and determination of the potential capabilities of a sports reserve in Nordic Combined consists of a number of key procedural and substantive components: organization of systemic pedagogical control over the preparedness of athletes; creation of a formula for calculating the individual-integral assessment of readiness and determining the potential capabilities of combined athletes; determination of the influence of each type of preparedness of the biathletes; inclusion in the formula of additional variables with the appropriate coefficients; development of a formalized table to determine the level of individual-integral assessment of preparedness and potential capabilities of Nordic athletes; determining the evaluation criteria for each type of preparedness and the final coefficient of the potential capabilities of Nordic skiers.

Keywords: *fitness monitoring, potential assessment, sports reserve training, Nordic Combined.*

Introduction. In the last 10-15 years, the role of monitoring the preparedness and states of athletes at each stage of long-term training has significantly increased, which has recently been focused on obtaining objective information about the motor potential of a particular athlete [1].

It is generally accepted that a sports result is the quintessence or an integral indicator of the fitness of athletes. However, evaluating an athlete solely on sports performance, it is impossible to determine the contribution of each type of fitness to achieving a specific place in the competition.

Objective of the study was to to develop a methodology for individual-integral assessment of readiness and determination of the potential capabilities of a sports reserve in Nordic combined.

Results of the study and their discussion. Systematization of the results of previous studies [1-3] made it possible to develop an innovative methodology for individual-integral assessment of readiness and determination of the potential capabilities of Nordic skiers, which consisted of the most important components.

The first key component of the experimental methodology was called “Organization of systemic pedagogical control over the preparedness of athletes.” This component was considered as the most important prerequisite factor in creating a system for objectively determining the individual-integral assessment of the readiness and potential capabilities of Nordic skiers. To do this, it is necessary to determine the means, methods of pedagogical control, form batteries of tests and indicators characterizing the most important types of preparedness of the sports reserve in Nordic combined.

Next, it is necessary to decide on the program of operational, current, milestone examinations of athletes and examinations of competitive activity, as well as with the scientists who will conduct them.

After conducting any type of examination, it is necessary to process the received information about the preparedness of athletes as soon as possible and transfer it to the coach or customer of the event.

The next substantive component of the developed methodology was "Creating a formula for calculating an individual-integral assessment of preparedness and determining the potential capabilities of Nordic skiers." The first fundamental research in this direction in Nordic combined was the scientific substantiation by the employees of the winter sports sector of the Leningrad Research Institute of Physical Culture (hereinafter referred to as LRIPC) of the formula for determining the complex preparedness and potential capabilities of athletes in Nordic combined [2].

As a result of this study, LRIPC scientists developed a formula based on special nomograms for each type of preparedness. The described formula looked like this:

$$IC_{PO} \frac{C_{GPT} + C_{SPT} + C_{TT} + C_{FT\,X} + C_{PT}}{N} \quad (1)$$

The main variables in this formula were the individual-integral coefficient of potential opportunities (IC_{PO}), the coefficient of general physical training (C_{GPT}), the coefficient of special physical training (C_{SPT}), the coefficient of technical training (C_{TT}), the coefficient of functional training (C_{FT}), the coefficient of psychological training (C_{PT}), the number of coefficients used in the numerator of the formula (N).

However, the researchers of Tchaikovsky State Academy of Physical Culture and Sports (hereinafter – TchSPhESA) continued research in this direction [1], which made it possible to modernize the formula developed by the LRIPC specialists.

TchSPhESA employees justified that the effectiveness of pedagogical control increases if the technical readiness of athletes is divided into jumping (C_{JTR}) and cross-country skiing (C_{CTR}), and functional readiness - into the functional state of the cardiovascular and respiratory systems (C_{FSCVRS}) and the functional state of the neuromuscular system (C_{FSNMS}).

As a result of these innovations, the formula for determining the integral coefficient of potentialities has taken the following form:

$$IC_{PO} \frac{C_{GPT}+C_{SPT}+C_{JTP}+C_{CTR}+C_{FSCVRS}+C_{FSNMS}}{N} \quad (2)$$

At the same time, the researchers of TchSPhESA proposed to exclude the coefficient of psychological readiness from the formula, arguing that in order to determine the motor capabilities of athletes, it is enough to rely only on the results of psychophysiological indicators.

Determination of the influence of each type of readiness involved in the calculation of the individual-integral assessment of the readiness and potential capabilities of Nordic skiers.

Employees of the TchSPhESA regularly recorded cases when the values of the coefficients of each type of preparedness, used in the formula as variables, had significant differences among athletes compared with each other, and the values of the individual-integral coefficient of potential opportunities (hereinafter referred to as IC_{PO}) were equal.

For clarity, as an example, we will give the results of two combined athletes of the same age and stage of sports training.

Results of the first Nordic skier:

$$IC_{PO} \frac{C_{GPT}0{,}5 + C_{SPT}0{,}6 + C_{JTP}0{,}7 + C_{CTR}0{,}5 + C_{FSCVRS}0{,}5 + C_{FSNMS}0{,}6}{6} = 0{,}6 \quad (3)$$

Results of the second Nordic skier:

$$IC_{PO} \frac{C_{GPT}0{,}5 + C_{SPT}0{,}7 + C_{JTP}0{,}5 + C_{CTR}0{,}7 + C_{FSCVRS}0{,}7 + C_{FSNMS}0{,}5}{6} = 0{,}6 \quad (4)$$

As can be seen from the example, the first biathlete had a predominantly jumping type of competitive readiness, while the second had a predominantly cross-country skiing type. However, the values of ICPO in both athletes were the same.

Taking into account the results of a number of authors [4, 5], the TchSPhESA staff asked the question: how accurately does the modernized formula determine the potential capabilities of Nordic athletes?

As a result, the employees of the TchSPhESA conducted a factorial study with the determination of the influence of each type of preparedness (factor) on the final sports result [1]. The results of this study showed that the greatest contribution to the dispersion (22.1%) was noted in the factor "cross-country skiing technical readiness", a significant contribution to the dispersion (19.7%) was recorded in the factor "jumping technical readiness". The values of the influence of other factors on sports results were lower. Thus, the factor of the functional state of the cardiovascular

and respiratory systems influenced the sports result by 17.6%, and the factor of the functional state of the neuromuscular system - by 16.8%. The factors with the least influence on sports results in Nordic combined were special physical fitness - 14.6%, general physical fitness - 9.2%.

Inclusion in the formula of additional variables with appropriate coefficients.

The results of the conducted factorial research indicated the expediency of a new modernization of the formula for determining the IQPV by including the factor load of each type of readiness as additional variables. In this regard, the percentage contribution to the variance of each factor was converted into a numerical format, rounded to two decimal places.

After performing the above operations, the re-modernized formula for determining the ICPO began to look like this:

$$IC_{PO} = \frac{(C_{GPT}xF_{GPT})+(C_{SPT}xF_{SPT})+(C_{JTP}xF_{JTP})+(C_{CTR}xF_{CTR})+(C_{FSCVRS}xF_{FSCVRS})+(C_{FSNMS}xF_{FSNMS})}{N} \quad (5)$$

The following variables were added to the already existing variables in this formula: factor value of GPT (FGPT) with a constant value of the coefficient - 0.92, factor value of SPT (FSPT) - 1.46, factor value of JTR (FPTP) - 1.97, factorial value CTR (FCTR) - 2.21, factor value FSCVRS (FFSCVRS) - 1.76, factor value FSNMS (FFSNMS) - 1.68.

The results of the first combined skier after repeated application of the formula:

$$IC_{PO} = \frac{(0,7x0,92)+(0,6x1,46)+(0,7x1,97)+(0,5x2,21)+(0,5x1,76)+(0,6x1,68)}{N} = 0,98 \quad (6)$$

Results of the second biathlete:

$$IC_{PO} = \frac{(0,5x0,92)+(0,7x1,46)+(0,5x1,97)+(0,7x2,21)+(0,7x1,76)+(0,5x1,68)}{N} = 1,01 \quad (7)$$

The re-application of the modernized formula showed that the results of the second biathlete, who had predominantly a cross-country type of competitive preparedness, were, although not much, higher than those of the first athlete with a predominantly jumping type of competitive preparedness. By comparing the obtained results with the corresponding formalized evaluation table (nomogram), it was found that the potential of the first biathlete corresponds to the average level, and the result of the second is above the average level.

Thus, the conducted studies aimed at modernizing the formula for determining the ICPO have made it possible to increase the accuracy of the calculations.

Development of a formalized table to determine the level of individual-integral assessment of the preparedness and potential capabilities of Nordic skiers. To develop formalized tables, one should use the method of constructing a variation series with the determination of the number and width of intervals. Then you should determine the frequency of hitting the results in each interval. Thus, the scale can have a different number of intervals.

Determination of evaluation criteria for each type of fitness of athletes. To use this formula, it was necessary to find the actual results of the athlete in each of the indicators, the values of which corresponded to the values of certain coefficients (from 1.0 to 0.1), after which it becomes clear at what level of development - model, high, medium, low (or using another scale) - the studied quality or ability is found [1].

The final determination of the integral coefficient of the potential possibilities of Nordic skiers. The final operation of the methodology was the final calculation of the individual-integral coefficient of the potential capabilities of Nordic skiers, the value and level of which were determined by a specially developed formalized evaluation table.

Conclusions. The developed methodology makes it possible to more effectively evaluate the preparedness and determine the potential capabilities of Nordic skiers at the stages of long-term sports training, allowing for targeted correction and programming of the training process of the sports reserve in Nordic Combined.

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Test assessment of the development of kickboxers coordination abilities of at the stage of sportmanship improvement

UDC 796.015

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Abstract

Objective of the study was to develop a set of methods for assessing the development of kickboxers' coordination abilities at the stage of improving sportsmanship.

Methods and structure of the study. In the experiment, methods of analysis and generalization of data from scientific and methodological literature and practical experience of trainers of the Fortuna sports and recreation center in Chaikovsky (Perm Territory) were used.

Results and conclusions. The composition of the innovative complex of methods for assessing the development of coordination abilities included the following control exercises: striking with hands and feet on a scoreboard with numbers (kinesthetic differentiation), performing technical and tactical actions in time with a metronome (rhythmic abilities), passing stations with performing technical and tactical actions without the participation of the visual analyzer (spatial orientation), performing technical and tactical actions on a conditioned signal (complex motor reaction), performing technical and tactical actions with a change in motor task (dexterity), performing technical and tactical actions in an unstable position (ability to maintain balance).

Keywords: *coordination abilities, a set of assessment methods, kickboxing, the stage of sportsmanship improvement.*

Introduction. The most important component of training activity is the control over the level of preparedness of athletes, which, in turn, stimulates specialists and coaches to search, develop and implement new and more effective ways to assess physical qualities and abilities in sports training. The dynamically developing type of martial arts is no exception - kickboxing, which imposes specific requirements on the technique demonstrated by athletes in complex coordination and dynamic situations of competitive activity.

Analysis of the results of studies by different authors [1-3] allows us to conclude that competitive performance in kickboxing largely depends on the speed of motor reactions, the ability to instantly make rational decisions and effectively implement them as quickly as possible.

The theoretical analysis of the research problem showed the importance of controlling the physical fitness of athletes in kickboxing, however, unfortunately, there are no scientific data on specific means of evaluating the development of kickboxers' coordination abilities at the stage of improving sportsmanship, which significantly reduces the effectiveness of sports training in this sport.

Objective of the study was to develop a set of methods for assessing the development of kickboxers' coordination abilities at the stage of improving sportsmanship.

Based on the theoretical analysis, it was found that, according to experts [4], the control of the level of coordination of athletes should be carried out by assessing the entire set of motor abilities: kinesthetic differentiation, rhythmic abilities, spa-

tial orientation, complex motor response, dexterity and balance.

The data obtained indicated the expediency of selecting specific kickboxing means to assess the entire set of kickboxers' coordination abilities, taking into account their qualifications and the specifics of the content of the stage of sportsmanship improvement. When selecting methods for assessing coordination abilities, the results of scientific research on martial arts and the practical experience of kickboxing coaches were taken into account.

After developing a complex for assessing coordination abilities, we tested it in the conditions of sports training of kickboxers at the stage of improving sportsmanship, which made it possible to describe the methodological features of its implementation.

Methods for evaluating different types of kickboxers' coordination abilities at the stage of sportsmanship improvement

Type of coordination abilities	Assessment method	General guidelines
Kinesthetic differentiation	Punching and kicking on the scoreboard with numbers	A scoreboard is hung in front of the subject with randomly located numbers on it in separate cells from 1 to 36. The tester names one number or a combination of numbers. The task of the subject is to reproduce a given combination of numbers by striking the cells in the shortest time period. This test evaluates the number of accurately delivered strikes on the specified cells in 60 seconds
Rhythmic abilities	Performing technical and tactical actions in time with the metronome	The tester selects the technical and tactical actions that will be performed by the test subject. Next, the interval of sound appearance (knocking) is set on the metronome, at the occurrence of which the subject must perform the specified technical action as quickly as possible. This test evaluates the ratio of the number of errors (untimely execution) to the total number of actions in 2 minutes
Spatial orientation	Passing stations with the performance of technical and tactical actions without the participation of a visual analyzer	The tester demonstrates to the subject a set of five technical and tactical actions for memorization. The task of the subject is to reproduce these actions at agreed points with tangible boundaries with an impenetrable bandage put on his eyes. This test evaluates the total time (min., s) spent on passing all stations
Complex motor response	Performing technical and tactical actions according to a conditional signal	The tester selects several conditional signals (3-4), each of which is associated with one or another technical and tactical action. This is reported to the test subject. External noise (music) is created. The subject's task is to reproduce the technical action corresponding to the signal as quickly and accurately as possible. This test evaluates the ratio of the number of errors (action that does not correspond to the signal) to the total number of actions in 2 minutes
Agility	Performing technical and tactical actions with a change in the motor task	The tester selects two conditional signals - a technical element that will be carried out by him. Cardinally different, but logically related, technical and tactical actions, which are implemented by the subjects, are tied to each conditional signal. The task of the subject is the fastest and most accurate transition from one action to another according to a conditional signal. This test evaluates the number of completed transitions from one motor task to another before making an error within 2 minutes
Ability to keep balance	Performing technical and tactical actions in an unstable position	A bench is used to implement this test. The tester chooses a technical-tactical action, or a set of actions implemented during testing. The task of the subject is the fastest and most accurate performance of technical and tactical actions without losing balance while standing on the bench. This test evaluates the number of technical actions performed before losing balance within 2 minutes

Results of the study and their discussion. In sports training, the scientific approach of V.B. Issurin and V.I. Lyakh [4], based on a comprehensive assessment of the coordination abilities of athletes. The authors propose to determine the level of coordination fitness of athletes, differentiating the methods of assessment by the following types of abilities:

• kinesthetic differentiation, which refers to the ability of an athlete to differentiate the spatial, temporal and power characteristics of movement in accordance with the given conditions;

• rhythmic abilities, which are manifested in the ability of athletes to notice, memorize, correct and reproduce the rhythm and tempo of movements when performing a motor task;

• spatial orientation characterizes the athlete's ability to determine and adequately correct their own body position and motor behavior in space;

• a complex motor reaction is characterized by the ability to accurately and timely respond with adequate motor actions to conditioned signals recognized among other extraneous (interfering) signals;

• dexterity is manifested in the ability of an athlete to quickly change direction and respond to pre-expected or sudden signals;

• maintaining balance, which refers to the ability to control the spatial position of the body while maintaining balance and stability of the posture [4].

The data obtained made it possible to develop a set of methods for assessing the development of each type of coordination abilities of kickboxers at the stage of improving sportsmanship, which is presented in the table.

This table presents the types of coordination abilities and methods for their assessment in kickboxers at the stage of improving sportsmanship.

The test "Kicking and kicking on the scoreboard with numbers" - allows you to assess the level of the kickboxer's ability to differentiate the spatial, temporal and power characteristics of technical and tactical actions in accordance with the specified conditions in terms of the total number of accurate hits on the numbers for 1 minute.

The test "Performing technical and tactical actions to the beat with a metronome" - the level of development of the kickboxer's ability to memorize, correct and reproduce the rhythm and tempo of technical and tactical actions is determined in terms of the percentage of erroneous actions (untimely performed) to the total number of actions in 2 minutes.

The test "Passing stations with the performance of technical and tactical actions without the participation of a visual analyzer" assesses the ability of a kickboxer to determine and timely correct his own body position and motor behavior in space when performing technical and tactical actions. The assessment of this ability occurs through the indicator of the time spent by the athlete to perform.

The test "Performing technical and tactical actions on a conditional signal" - determines the level of the ability of a kickboxer to accurately and timely perform technical and tactical actions in response to conditional signals recognized by the athlete among other extraneous (knocking down) signals. This ability is evaluated by the percentage ratio of erroneous actions (inconsistent with the signal) to the total number of actions performed in 2 minutes.

The test "Performing technical and tactical actions with a change in motor task" allows you to determine the ability of a kickboxer to quickly change the direction of movement and respond to pre-expected or suddenly occurring signals. With the help of this test, the trainer evaluates this ability by the number of transitions from one motor task to another before making an error within two minutes.

The test "Performing technical and tactical actions in an unstable position" - allows you to determine the level of the kickboxer's ability to control his own body position in space while maintaining balance and stability of the posture. This ability is evaluated by the number of technical actions performed before the athlete loses balance within 2 minutes.

Conclusion**s.** It has been established that in order to control the development of coordination of athletes, experts recommend assessing the ability to kinesthetic differentiation, rhythm maintenance, spatial orientation, the manifestation of a complex motor reaction, dexterity and balance.

Based on the established facts, a set of methods for assessing the coordination abilities of kickboxers at the stage of improving sportsmanship was developed, which included the following control tests: punching and kicking on the scoreboard with numbers (kinesthetic differentiation), performing technical and tactical actions in time with the metronome (rhythmic abilities), passing stations with the performance of technical and tactical actions without the participation of a visual analyzer (spatial orientation), performing technical and tactical actions on a conditional signal (complex motor reaction), performing technical and tactical actions with a change in motor task (dexterity), performing technical - tactical actions in an unstable position (ability to maintain balance).

At the moment, the developed complex has been in-

troduced into the training of kickboxers at the stage of improving sportsmanship in order to determine the normative values, which will allow kickboxing coaches and athletes to develop coordination abilities more effectively.

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Efficiency of using biofeedback methods in the training process of qualified swimmers

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Abstract

Objective of the study was to determine the effectiveness of the application of biofeedback methods in the training process of highly qualified swimmers for the formation of skills to differentiate movement parameters during swimming.

Methods and structure of the study. A pedagogical experiment was conducted from October 2021 to February 2022. It was held on the basis of swimming sections in the sports schools of the city of Belgorod, sports schools «Spartak» and School No. 3. Qualified swimmers consisting of 65 people took part in the experiment. The control testing included the calculation of the reproduction error as a percentage of the values of speed, pace and "step" of swimming among athletes.

Results and conclusions. Most athletes, especially beginners, do not know how to optimally distribute forces at a competitive distance. The passage of a distance, as a rule, is characterized by an increase in swimming speed to a maximum, an increase in the frequency of strokes and a small length of the “step” at the beginning of the distance and a decrease in the speed and frequency of stroke movements towards its end. In our opinion, accurate reproduction and the ability to control the values of speed, pace and "step" of swimming will help athletes achieve the optimal combination between these elements of technology, which in turn will help to achieve the maximum level of speed.

Keywords: *sports swimming, technical training, biofeedback methods, training process, movement structure.*

Introduction. The growth of achievements in cyclic sports is closely related to the development of fundamentally new ways to optimize the management of the training process [1]. In the modern theory of sports, one of the main problems of the process of sports improvement is the development and experimental substantiation of means and methods of technical training [2]. Previous studies indicate that the irrational distribution of efforts in the cycle of movements, fluctuations in speed within the cycle, violations of the spatial and rhythmic structure of movements lead to unjustified energy consumption. At the same time, an athlete who has encountered the listed difficulties cannot fully realize his potential at competitions [3].

In this regard, solving problems related to the technical training of swimmers is difficult without studying the structure of movements, analyzing the mechanisms of their formation and the possibilities of controlling them [4, 5].

Objective of the study was to t determine the effectiveness of the application of biofeedback methods in the training process of highly qualified swimmers for the formation of skills to differentiate movement parameters during swimming.

Methods and structure of the study. A pedagogical experiment was conducted from October 2021 to February 2022. It was held on the basis of swimming sections in the sports schools of the city of Belgorod, sports schools «Spartak» and School No. 3. Qualified swimmers consisting of 65 people took part in the experiment. The level of preparedness of athletes corresponded to the category “Candidate for Master of Sports”.

The control testing included the calculation of the reproduction error as a percentage of the values of speed, tempo and “step” of swimming. Average scores were calculated. Further, the error and the corresponding percentage were calculated. The listed indicators were measured in swimming by the chosen method at a distance of 25 m.

The training sessions of the experimental group included exercises related to counting and regulating rowing movements at different distances, taking into account the intensity of the load, determining and regulating the frequency of movements during swimming; to maintain and regulate the ratio of the frequency and length of rowing movements at different distances with different load intensity; exercises to maintain a certain swimming speed and its change at a distance by swimmers. To accurately reproduce the results, the coach determined, recorded and communicated to the athletes the parameters of the pace, frequency and speed of swimming during the tasks. Feedback tasks were applied at the end of the main part of the lesson.

Results of the study and their discussion. The data obtained in the course of preliminary testing state the fact that qualified swimmers do not have the ability to consciously control the kinematic indicators of movements in swimming. Summarizing the results of preliminary testing, we can note the homogeneity of the experimental groups. It was revealed that with the increase in speed, pace and step of swimming, the error in reproducing the given characteristics decreases in swimmers.

As a result of the experiment, the errors in reproducing the given values and the growth of opportunities in self-regulation and the accuracy of self-assessment significantly decreased (tables 1-3).

As a result of the experimental training in the EG, the accuracy and stability of the subjective reproduction of the given values increased. These changes are valid. In the CG, the results indicate the absence of significant changes.

The results of determining the accuracy of reproduction of the given values of the pace and swimming step after the experimental training with BFB revealed a significant decrease in the relative error of self-assessment of these parameters in athletes from the EG, while in the CG there was practically no increase in the accuracy of self-assessment of the values of the pace and swimming step.

In sport, the greatest potential for performance improvement lies in the improvement of technical components and thus in the transformation of the relationship of these parameters into sports performance. Most athletes, especially beginners, do not know how to optimally distribute forces at a competitive distance. The passage of a distance, as a rule, is characterized by an increase in swimming speed to a maximum, an increase in the frequency of strokes and a small length of the "step" at the beginning of the distance and a decrease in the speed and frequency of stroke movements towards its end. Therefore, coaches pay great attention to the formation of good coordination of the elements of swimming technique, in order to use this coordination in the distribution of forces at a competitive distance.

Table 1. *Reproduction error in % of swimming speed, M±m*

Target swimming speed	EG		t	CG		t
	Before	After		Before	After	
25%	24,08±0,92	15,85±0,47	+	24,76±0,97	22,96±0,78	-
50%	20,85±0,37	7,93±0,17	+	20,53±0,52	18,78±0,38	-
75%	8,45±0,17	5,25±0,19	+	7,35±0,19	6,46±0,20	-

Table 2. *Reproduction errors in % of swimming tempo, M±m*

Target swimming pace	EG		t	CG		t
	Before	After		Before	After	
25%	22,43±0,52	17,44±0,61	+	21,63±0,86	21,09±0,93	-
50%	18,87±0,31	10,03±0,25	+	19,40±0,42	18,87±0,47	-
75%	10,05±0,25	5,35±0,18	+	10,60±0,33	9,16±0,27	-

Table 3. *Reproduction errors in % of swimming "step", M±m*

Set «step» of swimming	EG		t	CG		t
	Before	After		Before	After	
25%	25,43±0,69	11,43±0,47	+	26,21±0,73	25,11±0,92	-
50%	22,19±0,29	8,58±0,24	+	22,64±0,34	21,42±0,34	-
75%	13,46±0,28	3,82±0,20	+	13,27±0,32	12,39±0,58	-

Conclusion**s.** The data obtained confirm our assumption that improving the ability to perceive the parameters of vegetative and motor functions allows increasing the efficiency of swimming activity in general. In view of this, it can be assumed that the level of perception (accuracy of self-assessment) to a certain extent determines the effectiveness of specific swimming activities.

In our opinion, accurate reproduction and the ability to control the values of speed, pace and "step" of swimming will help athletes achieve the optimal combination between these elements of technology, which in turn will help to achieve the maximum level of speed.

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Ergometric criteria for maximum anaerobic power of high qualified football players

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Abstract

Objective of the study was to analyze the speed-strength abilities of highly qualified football players.

Methods and structure of the study. The experiment involved 29 players from two football clubs in the Russian Premier League. The maximum anaerobic power (MAP) of the athletes was determined using bicycle ergometry using a Monark bicycle ergometer. The running speed was recorded using the speedographic method, which allows continuous real-time recording of the running speed curve throughout the entire distance.

Results and conclusions. The conducted research showed that the level of speed-strength abilities of highly qualified football players is at the average level. This suggests that athletes have a reserve that coaches should work on. In the operational control of the speed-strength readiness of football players, it is recommended to use an ergometric analysis of running speed, which makes it possible to determine informative indicators that characterize various aspects of running performance. Based on such an analysis, it is possible to make adjustments when designing training programs by selecting special exercises for developing lagging abilities.

Keywords: *maximum anaerobic power of players, speed-strength abilities of football players, ergometric analysis of running speed.*

Introduction. During a football match, players have to work in an alactic anaerobic mode with maximum speed and power, lasting 3-5 s, performing 30-40 maximum spurts [3, 6]. In such cases, the movement of football players with the ball or to the ball is energetically provided by the total content of adenosine triphosphoric acid (ATA) and creatine phosphate (CP) in the muscles. The reserves of ATA and CP in the human body are small and when performing the most intense work they are enough, depending on individual characteristics and the level of fitness for 6-8 seconds. If you continue to work at the same time, then the reserves of ATA and CP decrease and the output power decreases, that is, the maximum running speed decreases [1]. From this point of view, the maximum starting speed and maximum muscle power are among the leading factors that determine the physical performance of football players.

Objective of the study was to analyze the speed-strength abilities of highly qualified football players.

Methods and structure of the study. The experiment involved 29 players from two football clubs in the Russian Premier League. The maximum anaerobic power (MAP) of the athletes was determined using bicycle ergometry using a Monark bicycle ergometer. The load on the wheel was set at the rate of 75 $g \cdot kg^{-1}$ of the body weight of the subjects. An example of a power curve recording is shown in Figure 1.

The running speed was recorded using the speedographic method, which allows continuous real-

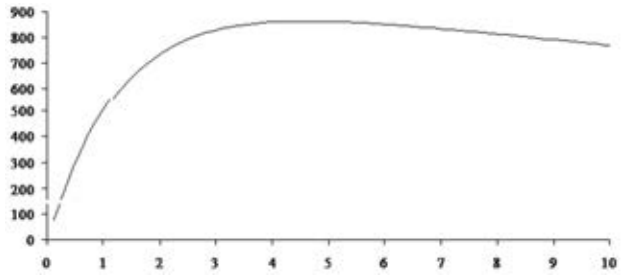

Figure 1. *Power-time dependence in the MAP test. On the abscissa - time (s), on the ordinate - power (W).*

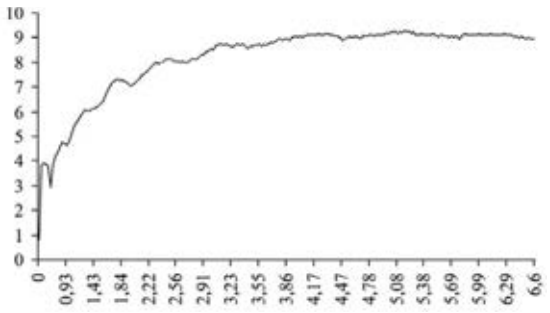

Figure 2. *Velocity-time dependence for 50 m run. Abscissa shows time (s), ordinate shows running speed ($m \cdot s^{-1}$).*

time recording of the running speed curve throughout the entire distance [2]. An example of running speed recording is shown in Figure 2.

Research results and discussion. The indicators of the maximum anaerobic power of football players are presented in Table 1.

As can be seen from the data in the table, the average value of the maximum power index (W_{max}) was 868.0 W. The value of such an indicator as the time to reach maximum power (T_{max}) is 4.14 s, and the indicator of maximum power retention time (T_{sp}) is 3.38 s. The data presented in the table demonstrate that the level of development of the maximum anaerobic power in the examined football players according to the value of such an indicator as $W_{max/rel}$ - 11.6 W/kg is below the average.

The speed abilities of football players are presented in Table. 2.

As can be seen from the data presented in the table, the value of the maximum running speed indicator (V_{max}) was 7.48 m s^{-1}, and the value of such an indicator as the time to reach the maximum running speed (T_{max}) was 4.89 s. The average value of the time to maintain the maximum running speed (T_{sp}) was 2.16 s. The running time of a five-meter segment (T_{5m}) was 1.17 s, 10-meter (T_{10m}) – 1.93 s, 15-meter ($T_{15\,m}$) – 2.60 s, 30-meter ($T_{30\,m}$) – 4.39 s and 50-meter ($T_{50\,m}$) – 6.68 s. The value of such an indicator as the distance to reach the maximum running speed (S_{max}) was 34.33 m. The value of the running speed indicator on a five-meter segment (V_{5m}) was 4.31 m s^{-1}, and on a 10-meter segment ($V_{10\,m}$) – 5.18 m s^{-1}.

As a result of the survey and analysis of the data obtained, it was found that the level of development of speed abilities in the examined football players is lower than in foreign players of the corresponding qualification [4, 5]. For example, on a 15-meter

Table 1. *Calculated indicators of maximum anaerobic power in the MAP test*

No. p / p.	Indicators	The average meaning	Standard deviation
1	W_{max}, W	868,0	59,7
2	T_{max}, s	4,14	0,95
3	T_{sp}, s	3,38	0,78
4	$W_{max/rel}$, W/kg	11,6	0,92

Table 2. *Calculated indicators derived from the analysis of the 50 m running speed curve*

No. p / p.	Indicators	The average meaning	Standard deviation
1	V_{max}, м·с$^{-1}$	7,48	0,31
2	T_{max}, с	4,89	0,64
3	T_{sp}, с	2,16	0,81
4	$T_{5\,м}$, с	1,17	0,08
5	$T_{10\,м}$, с	1,93	0,09
6	$T_{15\,м}$, с	2,60	0,09
7	$T_{30\,м}$, с	4,39	0,11
8	$T_{50\,м}$, с	6,68	0,18
9	S_{max}, м	34,33	5,68

segment, our football players lose 0.15 s to the football players of the Swedish national league, which at such speeds is about 1 m.

Conclusions. On the basis of the study, it can be concluded that the level of speed-strength abilities of highly qualified football players is at the average level. This suggests that athletes have a reserve that coaches should work on. In the operational control of the speed-strength readiness of football players, it is recommended to use an ergometric analysis of running speed, which makes it possible to determine informative indicators that characterize various aspects of running performance. Based on such an analysis, it is possible to make adjustments in the design of training programs by selecting special exercises for developing lagging abilities.

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Sports training of middle distance runners taking into account the peculiarities of the energy supply of their muscle activity

UDC 796.42

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Abstract

Objective of the study was to identify the main pedagogical conditions necessary to improve the effectiveness of the competitive activity of middle-distance runners, taking into account the peculiarities of the energy supply of their muscular activity.

Methods and structure of the study. A survey of coaches and qualified runners was conducted. In total, 19 coaches of the highest category and 19 runners with the sports qualification "Master of Sports of Russia" were interviewed. A correlation analysis was carried out to assess the degree of influence of the level of development of physical qualities on the effectiveness of the competitive activity of runners at medium distances.

Results and conclusions. It was revealed that the efficiency of middle-distance runners training can be increased by rationalizing the training process methodology, taking into account their individual characteristics of energy supply for their muscular activity, while maintaining the proportions of loads for improving physical qualities. The main physical quality that has the greatest impact on the effectiveness of the competitive activity of middle-distance runners is speed endurance.

Keywords: *training, distance, energy supply, muscle activity, athletics*

Introduction. Recently, there has been an increase in speed training among middle-distance runners. Such an approach to the organization of the training process of middle-distance runners leads to an increase in running speed, its efficiency, and an improvement in the functioning of the neuromuscular apparatus [2, 5].

In the course of research, it was found that the development of an individual training program that combines the motor actions of a runner with the features of the energy supply of their muscle activity is the most significant condition [2]. The trend towards the development of middle-distance running is such that the importance of anaerobic capabilities for competitive struggle increases every year. This requires middle-distance runners to complicate the preparation process while looking for additional reserves to improve athletic performance. Therefore, training must be built in such a way as to bring it as close as possible to the conditions of competitive wrestling. For this, it is necessary to develop an individual training program that combines the motor actions of runners with the features of the energy supply of their muscular activity against the background of great physical exertion. This approach to training middle-distance runners greatly simplifies the solution of the problem associated with increasing the efficiency of the training process [3].

Coaches in their work with middle-distance runners are little focused on the individualization of the organization of the training process. The peculiarities of the energy supply of muscular activity in the training process with middle-distance runners are not taken into account, which does not allow to effectively increase the effectiveness of their competitive activity.

A number of studies conducted in recent years have established that the application of an approach to the preparation of middle-distance runners, taking into account the peculiarities of the energy supply of their muscular activity, allows us to consider the organization of the training process from the standpoint of its individualization [1, 4].

Objective of the study was to identify the main pedagogical conditions necessary to improve the effectiveness of the competitive activity of middle-distance runners, taking into account the peculiarities of the energy supply of their muscular activity.

Methods and structure of the study. A survey of 19 coaches of the highest category and 19 qualified runners with the sports title "Master of Sports of Russia" was conducted. A correlation analysis was carried out to assess the degree of influence of the level of development of physical qualities on the effectiveness of the competitive activity of middle-distance runners.

Results of the study and their discussion. The survey made it possible to identify the most significant pedagogical conditions necessary for better training of middle-distance runners:

– development of an individual training program that combines the motor actions of a runner with the type of metabolism;

– the use of individual training regimens, in accordance with the type of metabolism;

– ensuring a rhythmic transition from aerobic to speed-strength load (Table 1).

Effective management of the training process is possible only with the idea of what energy processes should be developed and improved at different stages of training. To assess the degree of influence of the level of development of physical qualities on the effectiveness of the competitive activity of middle-distance runners, a correlation analysis was carried out (Table 2). In the course of the study, it was found that the main physical quality that has the greatest impact on the effectiveness of the competitive activity of middle-distance runners is speed endurance.

As can be seen from Table 1, the development of an individual training program that combines the runner's motor actions with the type of metabolism is the most significant pedagogical condition. It was also determined that the main physical quality that has the greatest impact on the effectiveness of the competitive activity of middle-distance runners is speed endurance. The trend towards the development of middle-distance running is such that the importance of anaerobic capabilities for competitive struggle increases every year. This requires middle-distance runners to complicate the preparation process while looking for additional reserves to improve athletic performance. Therefore, training must be built in such a way as to bring it as close as possible to the conditions of competitive wrestling. This approach to

Table 1. *Rank structure of the pedagogical conditions necessary for the training of middle-distance runners, taking into account the peculiarities of the energy supply of their muscular activity*

Significance (rank place)	Pedagogical conditions	Rank indicator %
1	Development of an individual training program that combines the motor actions of a runner with the type of metabolism	27,2
2	Application of individual training regimes, in accordance with the type of metabolism	22,8
3	Ensuring a rhythmic transition from aerobic to speed-strength load	17,3
4	Application of exercises to increase the anaerobic capacity of runners	12,7
5	Inclusion in the training of exercises to combine the motor and vegetative functions of athletes into a single system	11,1
6	The use of special indicators that ensure the uniformity of running over the distance	8,9

Table 2. *Correlation analysis for assessing the degree of influence of the level of development of physical qualities on the effectiveness of the competitive activity of middle-distance runners*

Rank	Physical Qualities	r	Degree of influence
1	Speed endurance	0,83	Very high
2	General endurance	0,68	High
3	Rapidity	0,53	Medium
4	Strength endurance	0,51	Medium
5	Agility	0,37	Below average

training middle-distance runners greatly simplifies the solution of the problem associated with increasing the efficiency of the training process.

Conclusions. In the course of the study, it was found that the effectiveness of training middle-distance runners can be increased by rationalizing the methodology of the training process, taking into account their individual characteristics of energy supply for their muscular activity, while observing the proportions of loads for improving physical qualities. The main physical quality that has the greatest impact on the effectiveness of the competitive activity of middle-distance runners is speed endurance.

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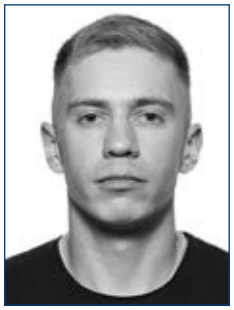
Sports training for 16-17 years old skiers-racers in mid-mountain conditions

UDC 796.015



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Abstract

Objective of the study was to determine the effectiveness of various approaches to the organization of the training process of 16-17 year old ski-racers in the competitive period in mid-mountain conditions.

Methods and structure of the study. The experiment involved two groups of young men with the 1st sports category, and a candidate for master of sports. The experimental group used the traditional approach with the inclusion of two cycles – adaptation and transition. The peculiarity of the organization of the training process was a gradual increase in the volume of low-intensity load against the background of monitoring adaptive-compensatory mechanisms and an increase in the intensity of the load by a repeated and variable method against the background of a reduced volume by the end of the cycle. The control group used a block approach, the features of which were the inclusion of a block of foothill training and the use of two peaks of high intensity in a weekly microcycle when training in the mountains, using the interval method against the background of underrecovery.

Results and conclusions. The results of the experimental group in all priority functional indicators significantly exceeded the results of the control group. A significant increase in the results in the 7.5 km race occurred in both groups and was almost the same. At the same time, it should be taken into account that the athletes of the control group used more stringent work regimes. This confirms the forcing of training, which, in our opinion, is unacceptable in these conditions for athletes of this age.

Keywords: *skiers-racers, training process, training in the middle mountains, functional indicators.*

Introduction. The current stage in the development of cross-country skiing is increasingly characterized by competitions in mountainous conditions, and athletes must be ready for them. In this regard, the question arises at what age it is necessary to start using training in mountainous areas in order to avoid the process of forcing training in young athletes - on the one hand, and to have time to identify athletes who actively respond to training in the middle mountains for their gradual acquisition of mountain experience, with the purpose of rapid adaptation to mountain conditions, on the other. The authors take the position that the age of 16-17 years is optimal for this, since it is a kind of transitional stage for cross-country skiers, after which they move to the stage of adult athletes and compete at the same distances as adults, and, accordingly, endure the same physical loads [1-3].

Objective of the study was to determine the effectiveness of various approaches to the organization of the training process of 16-17 year old ski-racers in the competitive period in mid-mountain conditions.

Methods and structure of the study. The experimental study was carried out during two training events in the competitive period of the annual macrocycle. The study involved 20 young men with the 1st sports category and the category of a candidate for a master of sports, 10 people each in the control and experimental groups. The first training event took place at an altitude of 1500-1600 m above sea level.

The second training event continued at an altitude of 1000 m.

The training process of the experimental group included two cycles. The first is adaptive. Its characteristic features include: a large amount of low-intensity work (zone 1); power and short speed work in the hall; reducing the volume and intensity of training; conducting skiing trainings of an aerobic nature lasting from 1.5 to 3 hours; the volume in long-term training varied, based on the preparedness and functional state of the athlete.

The second cycle is transitional. Its features are: volume training of low and variable intensity; conducting an ECG before starting a workout to identify functional abnormalities; conducting a long tempo free style training the next day after functional diagnostics (see Table 1).

A long tempo workout consisted of three series, each of which included: three laps of 2.5 km in intensity zone 2 (heart rate 140-160 bpm) and one lap of 2.5 km at the ANOT level.

Each series is performed continuously, except if the athlete needed to replenish the water-salt balance.

In table 1 shows the indicators that the athlete must adhere to in each circle and in each series.

Results of the study and their discussion. The training process of the experimental group was based on the scientific works of V.N. Platonov and V.N. Seluyanov, and consisted of six weekly microcycles, in which 23 full training days were planned, 10 days of unloading, of which seven days with rest in the morning, three days with rest in the afternoon and five full days recreation.

The peculiarity of the approach was that at the beginning of microcycles, the volume of low-intensity load was gradually increased by a uniform method, against the background of monitoring the adaptive-compensatory mechanisms of the body of young skiers. At the end of the cycle, the intensity of the load performed by the repeated and variable method increased against the background of a reduced volume. Such an alternation of loads, in our opinion, helps to reduce the risk of adaptive failures and poorly controlled processes in the functional system of the body.

The training process of the control group was built on the principle of block periodization. The peculiarity of this approach was the inclusion of a block of foothill training, followed by a block of training in mountain conditions, including “calm aerobic work” in the acute and transitional phases of acclimatization and “hard work” in the stabilization phase. After that, the control group performed the work using the same microcycles as the experimental group, but the training process used an approach using two peaks of high intensity in a weekly microcycle. In the training process of the control group, various intensities were used, including the use of the interval method, in which a repeated load was performed against the background of incomplete recovery.

As the main criteria determining the effectiveness of the proposed training approaches, we used the functional indicators of cross-country skiers, which

Table 1. *Indicators that an athlete must adhere to on each circuit and in each series of a long tempo workout*

Series	1st round, min, s	2nd round, min, s	3rd round, min, s	4th circle (ANOT), min, s
1	9:05	9:15	9:10	7:35
2	9:15	9:15	9:30	7:30
3	9:00	9:05	9:20	7:25

Table 2. *Comparison of functional indicators of cross-country skiers using different mountain training approaches*

Functional indicator	KG X±m	EG X±m	KG X±m	EG X±m
	Before training in the mountains		After training in the mountains	
Rufier test (index)	3±0,16	3±0,1	3±0,15	2±0,1
Robinson index	94,3+0,8	93,9±0,8	92+1,3	87,8±0,8
Stange test, s	86±0,3	84±0,3	87±0,5	95±0,5
Genchi test, s	23±0,2	24±0,2	25±0,2	32±0,2
Hemoglobin level (g/l)	148±0,6	150±0,7	152±0,6	156±0,7
VC (l)	4,15±0,09	4,24±0,08	4,47±0,06	4,91±0,25

have the highest correlation with the result in distance races (see Table 2).

According to the table above, it can be concluded that the results of the experimental group in all priority functional indicators significantly exceed the results of testing the control group. In this regard, it can be argued that the approach used by the experimental group turned out to be more effective than the approach of the control group in terms of functional shifts.

In addition to functional indicators, the results of control starts in skiing at a distance of 7.5 km, carried out before and after using different approaches in training in the middle mountains, were compared. Both control starts were held on the plain at the same complex. A significant increase in the results in the control group was 31 s in the experimental group 35 s. This once again confirms the effectiveness of using the middle mountains in the training of cross-country skiers. Despite the fact that the improvement in the results of both groups is almost the same, it is worth considering that the athletes of the control group used more stringent work regimes than the athletes of the experimental group, thereby there was an element of forcing, which, in our opinion, is unacceptable for athletes of this age and in these conditions.

Conclusion**s.** The middle mountains are an effective height for the training process of ski racers aged 16-17. A properly organized training process at such a height can give a very impressive addition to the sports results of athletes of this age group. To do this, you must adhere to the following rules:

– gradually increase the level of heights starting from 900-1500 m at the beginning of the use of the middle mountains and, with the acquisition of mountain experience, bring it to the level of 2500 m;

– during the period of acclimatization, it is necessary to reduce the total volume of the load by 10-15% of that performed in the usual flat conditions;

– reduce the load to adapt to new climatic conditions and create conditions to ensure a favorable restructuring of the body and maintain an optimal level of fitness in the first week after returning from the mountains to the plains;

– to connect the structure and content of the training process during the period of reacclimatization with the training process carried out in the middle mountains;

– the main methods of training cross-country skiers 16-17 years old in mid-mountain conditions should be uniform and variable.

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Features of strength training of girls 18-25 years old involved in bodybuilding

UDC 796.015.52

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Abstract

Objective of the study was to develop and experimentally test the methodology of strength training for girls aged 18-25 who go in for bodybuilding.

Methods and structure of the study. The experiment was conducted on the basis of the Regional Bodybuilding Federation of the Perm Territory, 18 girls aged 18-25 took part in it, divided into the control (CG) and experimental (EG) groups. In the EG, a method of strength training was introduced, based on the inclusion in the split-programs of sets of exercises performed on simulators, with free weights, jerk-braking exercises and exercises with rubber expanders. The strength abilities of the girls were assessed using control tests, assessment of fat and muscle components.

Results and conclusions. Thanks to the developed methodology, it was possible to significantly improve the strength abilities of the subjects of the experimental group in the "bench press" by 92.6%, in the "sitting press" by 58%, in the "squat with a barbell" by 68.6%, in "lifting the body from the position lying in a sitting position" by 42.4%, in "flexion-extension of the arms, in lying position" by 66%, to increase the muscle component and reduce the fat component, which is an indicator of the optimal form for participating in bodybuilding competitions.

Keywords: *bodybuilding, strength abilities, training methods, hypertrophy.*

Introduction. In the bodybuilding training process, the focus is on hypertrophy and symmetry of the muscle fiber, while the development of strength abilities is only of additional importance, while it is important to take into account the morphological and functional characteristics of girls [1]. That is why the strength training of girls for bodybuilding competitions should be based on the individualization of the training process based on the physiological characteristics of the female body [2].

Thus, a contradiction is revealed between the high potential of bodybuilding in terms of physique correction, increasing the level of physical condition, and the insufficient number of developed methods of strength training for girls aged 18-25. The above contradictions allow us to formulate the problem: what means and methods should be used in the strength training of girls 18-25 years old involved in bodybuilding?

Objective of the study was to develop and experimentally test the methodology of strength training for girls aged 18-25 who go in for bodybuilding.

Methods and structure of the study. The experiment was conducted in 2021 on the basis of the Regional Bodybuilding Federation of the Perm Territory (Perm), which was attended by 18 girls aged 18-25, nine people each in the control (CG) and experimental group (EG). In the training process of the girls of the experimental group, a strength training methodology was introduced, including sets of exercises performed on simulators and with free weights. The duration of the experiment was one year - 192 training sessions. Of these, 112 workouts were aimed at hypertrophy "mass gain", and 80 workouts were aimed at "drying" (40 sessions for the initial and final periods). At training sessions with girls, an individual approach was implemented in the preparation of training programs, mobile applications for

nutrition control (FatSecret, Yazio, LifeSum) were recommended, and individual recommendations were made on nutrition during the period of "mass gain" and "drying". The component body composition of girls was also monitored using the InBody720 hardware complex, the operation of which is based on bioimpedance analysis [4, 5].

Results of the study and their discussion. Based on the analysis of previous studies on the characteristics of the strength training of girls involved in bodybuilding, a method was theoretically developed and experimentally tested. The "method of strength training for girls" is understood as a set of means, methods and conditions aimed at achieving the goal (Figure 1). Methods used in the training process of the experimental group: circular, repeated efforts, maximum efforts, isometric efforts. The main means of developing strength abilities were the sets of exercises included in the split-programs performed on simulators, with free weights, jerk-braking exercises and exercises with rubber expanders.

A theoretical component was included in each training session with the girls of the experimental group, during which the features of nutrition during various periods of training, questions related to strength exercises, their impact on individual muscle groups were revealed, and an accompanying explanation was also given on the direction of different exercises.

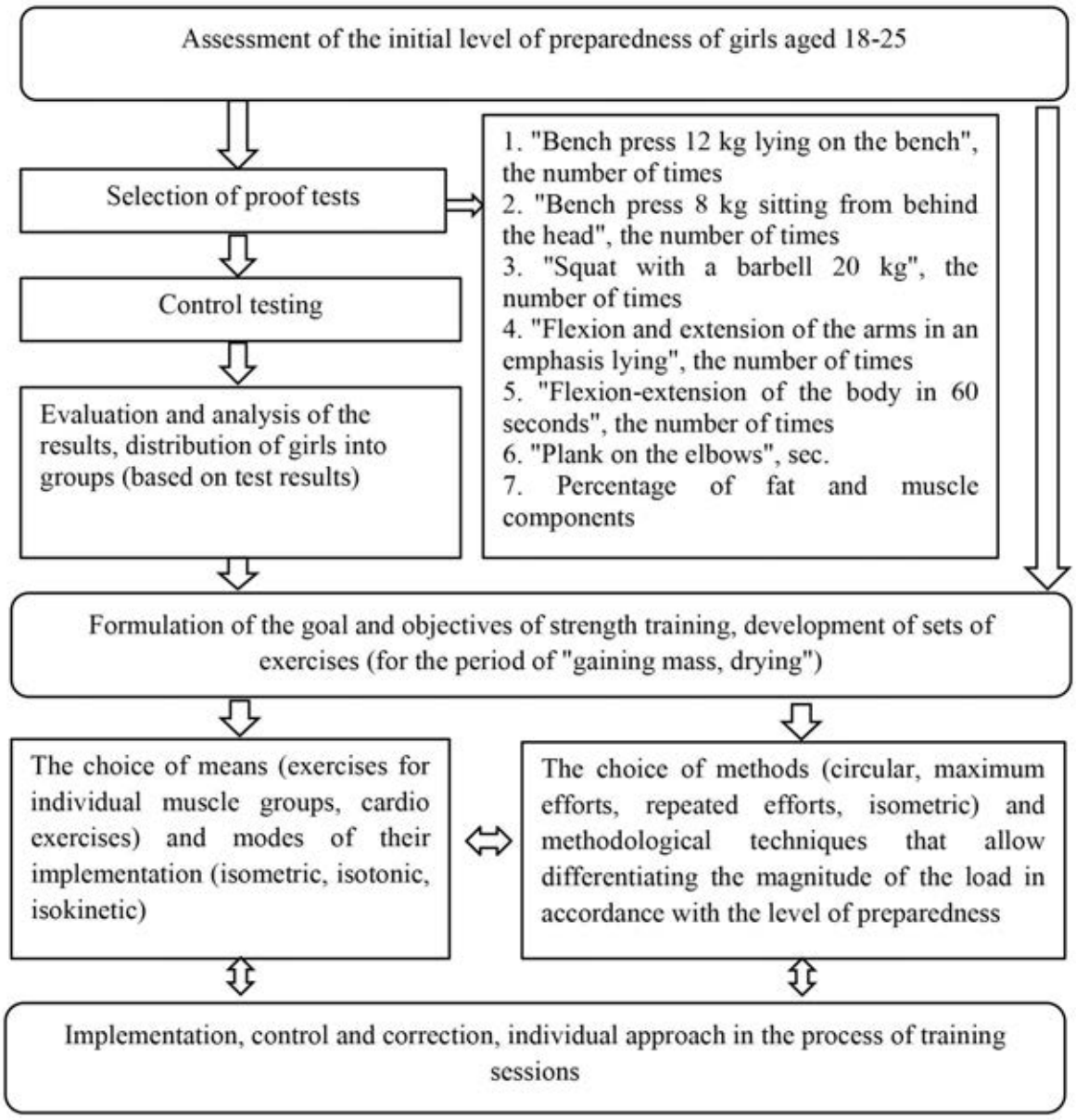

Figure 1. *Strength training methodology for girls aged 18-25*

For each training session, special complexes for the development of strength abilities were developed, containing various methods and means, depending on the period of preparation for "drying" or "mass gain". According to the developed methodology, 14 weeks (112 training sessions) were allotted for "mass gain", during the preparation period, the maximum effort method was preferred, the exercises were performed three to four approaches, the number of repetitions was 10-12 times. Mandatory control of nutrition and well-being of girls was carried out.

In turn, "drying" implies the implementation of a certain set of exercises, the most optimal method is circuit training, while the maximum load should not exceed 75-80% of the weight of those intended to increase muscle mass. During the "drying" period at each training session for 40-50 minutes (50% of the main part of the session), the advantage was given to cardio exercises, the intensity and duration of the complexes increased, the number of repetitions increased to 30. The results of the assessment of strength abilities are presented in the table.

The effectiveness of the developed methodology was confirmed by the following results of the subjects during the control tests: in the "Bench press lying on a horizontal bench" - the result in the EG increased by 92.6%, in the CG - by 52%, in the "Bench press sitting" - the result of the girls from the EG increased by 58%, CG - by 36.4%, in the "squat with a barbell" - in the EG - increased by 68.6%, in the CG - by 39.2%, the exercise "Flexion-extension of the body in 1 minute" - the result in the EG it increased by 42.4%, in the CG – by 11.2%, in "flexion and extension of the arms, in the lying position" – the result of the girls in the EG increased by 66%, in the CG – by 40%. A fixed difference in the results of the subjects of the experimental groups was found in all control trials at the end of the experiment, with higher values in the experimental group.

Next, we will consider how the indicators of body composition in girls have changed under the influence of the developed methodology during the period of "mass gain" and "drying" (Figure 2).

The data presented in Figure 2 indicate that the developed strength training technique turned out to be more effective than the generally accepted one in terms of its effect on the fat and muscle components, especially during the "drying" period. So, for example, in the EG at the end of the period, the percentage of muscle mass is 52.7%, and fat - 11%, which is an indicator of the optimal form for participation in bodybuilding competitions. Significant changes in the composition of the body, both during the period of "weight gain" and during the period of "drying", were influenced by the developed methodology, which also includes recommendations on nutrition, food intake and regimen.

Comparing the data obtained with the results of studies by D.V. Nikolaeva, S.G. Rudnev, we can conclude that in girls from the EG, with the content of the muscle component over 50%, and the fat component in the range of 11-13%, an increase in strength indica-

The results of the assessment of strength abilities in girls at the beginning and end of the experiment

Control test	Stages of the experiment	$\bar{x}\pm\sigma$		
		CG	EG	p
«Bench press (12 kg)», the number of times	start	16,2±0,9	17,8±0,9	>0,05
	end	23,1±0,9	34,35±0,88	<0,05
	p	<0,05	<0,05	
«Bench press sitting (8 kg)», the number of times	start	12,9±0,7	13,1±0,7	>0,05
	end	17,6±0,8	20,7±0,84	>0,05
	p	<0,05	<0,05	
«Barbell squat (20 kg) », number of times	start	32,4±2,0	34,3±3,0	>0,05
	end	45,1±2,3	58±4,3	<0,05
	p	<0,05	<0,05	
«Flexion and extension of the arms in an emphasis lying», the number of times	start	20,2±0,70	21±1,2	>0,05
	end	28 ±0,72	35±1,2	<0,05
	p	<0,05	<0,05	
«Bending-extension of the body in 60 s», the number of times	start	36±2,3	32,8±3,1	>0,05
	end	40±4,1	47±2,23	<0,05
	p	<0,05	<0,05	
«Elbow plank», s	start	61,8±7,3	58,7±5,3	>0,05
	end	89,2±9,3	120,4±8	<0,05
	p	<0,05	<0,05	

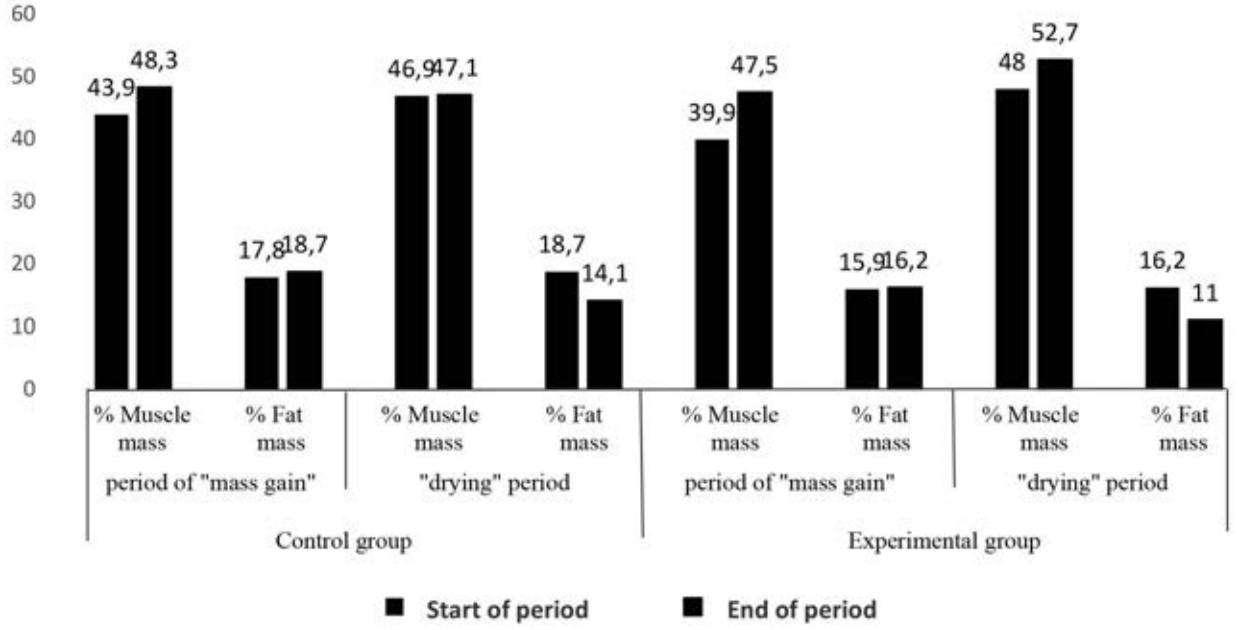

Figure 2. *Change in fat and muscle components in girls at the beginning and end of the experiment (results of bioimpedance analysis), %*

tors was also recorded [3]. Therefore, it is important to provide an individual approach to each athlete, strictly dose the load, exercise control over the quality of nutrition, and regularly undergo a medical examination.

Conclusions. he proposed methodology focuses on the features of the strength training of girls in different periods (mass gain and "drying"). So, in the period of weight gain, the girls used sets of exercises using training devices, the advantage was given to the maximum effort method. During the "drying" period, the proportion of cardio exercises increased, the complexes were implemented in a circular manner, with the emphasis on certain muscle groups. The training process was of an individual nature, which made it possible to achieve the optimal competitive form, without harming the health of the athletes. The proven method of strength training of girls aged 18-25 involved in bodybuilding has proven its effectiveness, as evidenced by the improvement in the results of control tests that evaluate strength abilities, and the results of bioimpedance research.

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Regulation of pre-start states of judoists at the stage of sportsmanship improvement

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Abstract

Objective of the study was to theoretically and methodically substantiate the method of regulation of the pre-start states of judo wrestlers at the stage of improving sportsmanship.

Methods and structure of the study. A survey was conducted among judoists of the Perm region, who were at the stage of improving their sportsmanship. The practical experience of coaches of the judo club "Bars" (Perm) and the municipal budgetary sports and health club "Judo and Sambo" (Tchaikovsky), as well as psychologists of the regional judo federation, is summarized.

Results and conclusions. Based on the results of the analysis of literary sources on the topic of research and generalization of the experience of judo coaches and sports psychologists, an innovative methodology was developed based on the cumulative implementation of the means, methods and conditions for regulating pre-start states and aimed at achieving the state of combat readiness of judokas at the stage of improving sportsmanship.

Keywords: *psychological preparation, methodology, regulation of prelaunch states.*

Introduction. Sports achievements in modern judo not least depend on how well the athlete is psychologically prepared. The outcome of a competitive duel, according to experts [3-5], is largely influenced by: the strength and mobility of the nervous system, emotional stability, the ability to control the state of anxiety, as well as the level of activation and aggressiveness.

Specialists [1, 2, 5] distinguish two undesirable reactions to stress that are typical for a judoist immediately before a competitive fight: 1) a state of heteroaggression (hyperexcitation is observed, expressed by aggressive behavior; high blood pressure; rapid pulse and breathing; increased muscle tone) and 2) a state of auto-aggression (dissociation is observed; detachment, daydreaming; heart rate and blood pressure are less than normal; lethargy in the muscles). The task of the coach (from the point of view of psychological preparation) is to keep his judoist in a state of combat (optimal) readiness and not to let him, under the influence of a stressful situation, go into a state of apathy or fever immediately before the fight.

The problem of modern psychological training of judokas of the Perm region aged 15-18 years is that athletes (not members of the national teams and teams of the region) of this age are not fully and systematically accompanied by psychologists, and personal trainers are not always competent in this area. The most common in martial arts methods for diagnosing and correcting pre-start conditions do not meet modern conditions for holding competitions at various levels, so their use becomes ineffective [2, 4, 5].

One of the solutions to this problem, in our opinion, can be the use in the training process of judokas at the stage of improving sportsmanship of the methodology for regulating pre-start states. At the age of 15-18 years, stable neural connections are formed, which indicates a predisposition to the successful use of means for regulating pre-launch states during this period.

Objective of the study was to theoretically and methodically substantiate the method of regulation of the pre-start states of judo wrestlers at the stage of improving sportsmanship.

Methods and structure of the study. Based on the analysis of literary and documentary sources, it was determined that methods or individual exercises for diagnosing and correcting pre-start conditions should be designed for a minimum amount of time and use appropriate means and methods during competitive activity (special physical exercises of a judoist, bodily practices, breathing exercises, technical - tactical signature techniques), in order to enable the athlete to consolidate a new (corrected psychological state) and conduct a full-fledged technical and tactical preparation for a duel with an upcoming opponent [2, 4, 5].

A survey among judokas of the Perm region who were at the stage of improving their sportsmanship and had the following sports qualifications - I adult sports category (38 judokas) and Candidate Master of Sports (CMS) category (12 judokas) - showed that 76% of athletes cannot independently bring themselves into a state of combat readiness before a duel with a principal opponent (an opponent to whom they lost in the last personal meeting or lose systematically) or with a little-studied opponent at competitions of various levels. At the same time, 92% of athletes note the lack of systemic psychological and pedagogical support from a personal trainer and effective regulation of the psychological state immediately before a competitive duel.

The results of the survey of athletes and the generalization of the practical experience of the coaches

Examples of means used in the method of regulating the pre-start state of judokas at the stage of improving sportsmanship

Prelaunch state	Means (applied 5-10 minutes before the competitive duel)	Dosage
Autoaggression	• mobile games of wrestlers (games in openings and with tasks aimed at overcoming apathy and activating muscle groups participating in a competitive fight)	2-3 repetitions for 10-15 s
	• bodily practices (self-massage or exercises using objects): - the use of a manual expander to enable grasping muscles to work; - self-massage of the muscles of the foot using rubber balls with a diameter of 3-5 cm (kneading the muscles by pressing and rolling the ball over the entire surface of the foot)	– 2-3 repetitions for each brush 6-8 times – 2-3 repetitions for each foot for 15-20 s
	• technical and tactical crown techniques (performing crown attacking techniques and combinations to overcome the state of apathy and include the necessary muscle groups in the work)	– 2-3 repetitions 4-5 times (in the leading direction)
	• breathing exercises (diaphragmatic breathing)	– 2-3 repetitions of 8-10 respiratory cycles
Heteroaggression	• mobile games of wrestlers aimed at performing defensive and counterattacking actions (games of touching, pushing) to overcome the state of pre-launch fever and include an analysis of the opponent's actions	2-3 repetitions for 20-25 s
	• bodily practices (self-massage or exercises using objects) are performed for the number of times in the allotted time (to overcome the pre-start fever and normalize the judoist's thought processes): - use of a manual expander; - self-massage of the muscles of the foot using rubber balls with a diameter of 3-5 cm (kneading the muscles by pressing and rolling the ball over the entire surface of the foot)	– 2-3 repetitions for each brush 4-5 times in 10 seconds – 2-3 repetitions for each foot for 20-25 s
	• technical and tactical crown techniques (performing crown protective and counterattacking techniques and combinations to overcome the state of pre-launch fever)	2-3 repetitions 4-5 times (in the leading direction)
	• breathing exercises	2-3 repetitions of 15-20 respiratory cycles

of the judo club "Bars" (Perm) and the municipal budgetary sports and health club "Judo and Sambo" (Tchaikovsky), as well as psychologists of the regional judo federation served as the basis for developing a methodology for regulating pre-start states of judo wrestlers at the stage of sportsmanship improvement.

Results of the study and their discussion. The main objective of the experimental technique was the diagnosis of the current psychological state of the judoist and its regulation to the state of combat readiness.

The study used the following methods for diagnosing the pre-start conditions of judoists aged 15-18:

1) *Dynamometry.* Allowed to evaluate the force of contraction of the muscles of the hand of judoists. This method was used after the preparatory part of the training session (to determine the athlete's individual norm). In competition conditions, this method was used 10-15 minutes before the fight. If the current indicator of the athlete's dynamometry was below the norm, then this indicated a state of auto-aggression (lethargy of the muscle fibers necessary for conducting a competitive fight). If a judoist had an excess of the norm, then this indicated a state of heteroaggression (excessive muscle tension).

2) *Respiration rate.* In competitive activity this method was used 10-15 minutes before the competitive bout. If the current indicator of the respiratory rate is below the norm, then this indicated a state of auto-aggression (a state of "fading", detachment from what is happening around). If the athlete's result exceeded the individual norm, then he had a state of heteroaggression (the judoka is in a state of pre-start fever).

3) *Diagnosis of the posture of a judoist* was determined visually by a personal trainer together with a team psychologist. In competitive activity this method was used 10-15 minutes before the competitive bout. The posture characteristic of the pre-start psychological state of auto-aggression had the following characteristics: the athlete put his legs close to each other or put one leg back; legs were straight; allowed excessive deviation of the back and head back; made the minimum number of low-amplitude movements; under certain situations, and took the position of gray hair and inaction. In the state of heteroaggression, the judoka tilted his torso and head forward, rounded his shoulders (as in wrestling); legs bent and placed slightly wider than shoulders; made a large number of active and short-term movements (not concentrating on the long-term performance of one movement).

To regulate the pre-start states of judo wrestlers, the following means were used as part of the developed methodology: wrestlers' outdoor games, bodily practices, technical and tactical crown techniques, breathing exercises. Examples of the means used to regulate the pre-start states of judo wrestlers are presented in the table.

Conclusions. Distinctive features of the developed methodology is the dosed use of special means aimed at regulating the pre-start states of judokas at the stage of improving sportsmanship, which is currently being tested in sports clubs in the cities of Perm and Tchaikovsky.

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Psychological preparation of coaches to work with athletes with autism spectrum disorders

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Abstract

Objective of the study was to scientific substantiation of the technology of psychological preparation of trainers for interaction with persons with autism spectrum disorders.

Methods and structure of the study. Analysis of literary and other information sources, summarizing the experience of specialists, survey, focus group. The collection of empirical data was carried out during the implementation of advanced training courses "Psychological training of coaches for work in sports for people with intellectual disabilities" (teacher A.G. Gretsov), 18 specialists participated.

Results and conclusions. A program of psychological training of coaches to work with athletes with autism spectrum disorders is proposed, designed to increase the effectiveness of interaction with them, as well as personal satisfaction with professional activities. It is advisable to include in the psychological training of trainers working in this field: the study of the psychological characteristics of people with autism spectrum disorders; training in the development of special communication skills for working with this contingent; mastering the basic techniques of psychological support for such athletes; personal training (realization of the subjective meaning of work in this area, search for personal resources, etc.).

Keywords: *sports of people with intellectual disabilities, autism spectrum disorders, training of trainers.*

Introduction. Athletes with autism spectrum disorders (ASD) represent the most heterogeneous group both in terms of physical development and psychological characteristics. Persons with ASD in sports in most cases cannot compete on an equal footing with other groups of persons with intellectual disabilities; within this nosological group, a very narrow stratum of participants can also really claim high sports achievements.

As a result, coaches working in the sport of persons with intellectual disabilities (PID) (in contrast to specialists in adaptive physical culture working with a similar contingent) most often interact with people whose ASD is presented in a relatively mild, partially compensated form - otherwise such athletes simply could not stand the competition with rivals. At the same time, the fact of a significant decrease in intelligence in such athletes always takes place. Individuals with pronounced signs of ASD in behavioral terms, but with intact intelligence ("Asperger's syndrome"), remain outside the scope of the modern sports functional classification, since one of the most important criteria in it concerns a decrease in intelligence, expressed quantitatively (IQ index).

In this regard, the task of training coaching staff to work with people with ASD is relevant. On the one hand, it is solved through the development of methodological aspects of sports training. Persons with ASD have features of physical development - in particular, motor disorders, proprioceptive sensitivity are common. Undoubtedly, this reduces the possibility of their sports achievements (especially in complex coordination disciplines) and requires consideration in the work of a coach. However, such violations are still not so fundamental as to make it impossible to extrapolate methods from both the "traditional" sport of PID and

from ordinary sport. On the other hand, it is necessary to prepare trainers to take into account the psychological characteristics of such people, and above all, to communicate effectively with them. The specificity of working with athletes with ASD is most clearly manifested precisely in this aspect.

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Results of the study and their discussion. Data characterizing the attitude of coaches to work with athletes with ASD, and the difficulties that arise in this case, were obtained in a group of specialists (n=18) who took advanced training courses. All of them work in the sport of PID, represent different sports disciplines (a comparative analysis was not carried out due to the small sample size) and have experience of interacting with representatives of various nosological groups: "classic" intellectual disability, ASD, Down syndrome (see table).

Thus, experts note that it is more difficult to work with people with ASD than with other groups related to the sport of PID, and they are unanimous in their opinion that special training is needed for this. The knowledge and skills that are missing for effective work relate, first of all, to understanding and taking into account the characteristics of this contingent, and not the sport of PID in general or general methodological issues.

Opinions about the groups of which it is advisable for such athletes to engage in (question 3) differ, but the option of inclusion with ordinary athletes slightly prevails. Classes in general groups with people with intellectual disabilities of a different nature are not very desirable, since such conditions are stressful for people with ASD, which encourages them to withdraw into themselves even more.

The challenges faced by coaches working with athletes with ASD were fleshed out during a focus group discussion with the same participants. The main difficulties are as follows:

Results of a survey of specialists working in the field of PID sports

Question	Answer options
Assess the difficulty of working with different categories of people involved in PID sports (score on a 5-point scale)	«Classic» intellectual disability - 3.9 ASD - 4.3 Persons with Down syndrome - 3.6
Is it necessary to single out athletes with ASD in a separate sports-functional class?	Yes - 78% No - 5% Difficult to answer - 17%
Should athletes with ASD train with others like them?	Yes, it is better to form separate groups of them - 28% They can train with other PID sport groups – 21% Better inclusive model (training with regular athletes) – 40% Difficult to answer - 11%
What kind of knowledge, skills do you lack to work with athletes with ASD?	Reflecting the specifics of ASD - 40% Reflecting the specifics of PID sports - 28% About the theory and methodology of sports training in general - 16% General psychological and pedagogical - 16%
Is special training required to work with athletes with ASD compared to other types of PID?	Yes - 100%

• People with ASD periodically seem to "hang out", withdraw into themselves, and contact with them is interrupted.

• Feedback is difficult: when you explain something to such a person, it is not clear whether he understood or not.

• These people are not inclined to obey the rules set from the outside; one gets the impression that they live by the rules that they have created for themselves.

• When difficulties arise, an athlete with ASD does not seek help, but, on the contrary, withdraws into himself.

• A person with ASD may react to our words and actions in completely unexpected ways. In general, the behavior of such people is difficult to predict, the coach requires constant attention and control.

• Athletes with ASD have poor imitation, and instructions such as "do it like me/like someone else" are hard to come by.

• An athlete with ASD is easily "knocked out" by any unexpected situation when something went wrong (especially in competitions).

• Athletes with ASD do well with repetitive, cyclical activities, but perform much worse in situations where the nature of the activity needs to change quickly (such as in sports).

• The work is difficult in personal terms: it requires the investment of large emotional resources, and the "return" is less than we would like. This causes dissatisfaction with their own activities, increases the risk of professional burnout.

The analysis of the identified difficulties is the basis of the program of psychological training of specialists to work with athletes with ASD. It includes four modules and is designed for 16 academic hours.

Module 1. Psychological characteristics of persons with ASD. For successful coaching with such a contingent, it is more important not so much to master the psychological and medical theories that explain the nature of ASD, but to understand how the pedagogical impact will be perceived, taking into account the mental characteristics of the addressee. The intellect of these people does not function "worse", but is qualitatively different from that of ordinary peers. It is necessary to be able to mentally reconstruct their subjective reality in order to adequately select ways to influence them. It is proposed to pay the main attention to the analysis of cases that reflect various situations that arise during pedagogical interaction with this contingent. Using their examples, specialists should be taught to "look at what is happening through the eyes of their wards", to predict how this or that situation will be interpreted in their subjective reality, and what behavioral consequences it may lead to.

Module 2. Training for the development of special communication skills for working with people with ASD. Communication skills are effectively developed in the course of trainings, which implies game-technical modeling of situations that serve as a source of personal experience, and the creation of conditions for its reflection. The training includes the following sections:

• Improving the use of verbal and non-verbal means of communication.

• Training of social observation, receptivity.

• Communication techniques for effective interaction with people with ASD.

Module 3. Basic techniques of psychological support for athletes with ASD. It is the coach who often turns out to be the one from whom psychological support is expected in the first place (especially if they are people with ASD, whose social activity is extremely limited). The task of turning a trainer into a counseling psychologist is not set, however, mastering some professional methods of individual and group psychological work will allow you to act more effectively than just guided by intuition. Relevant techniques of short-term counseling and psychological training, allowing to influence the emotional sphere. In particular, it is proposed to master:

• Basic communication skills that allow you to have a helpful dialogue (active listening, paraphrasing, reflecting feelings, techniques of "joining" with the interlocutor).

• Techniques of rapid impact on the emotional sphere (use of means of visual and plastic expression, suggestion and self-hypnosis).

• Methods of self-regulation, overcoming stress (relaxation techniques, breathing exercises).

• Techniques of group psychological work aimed at interaction in a team, increasing the degree of emotional involvement in classes.

Module 4. Personal training for professionals working with athletes with ASD. Main areas of work:

• Reflection of the personal meaning of professional activity in sports PID.

• Planning the trajectory of professional self-development, awareness of resources and obstacles.

• Improving the skills of time management, goal setting and planning.

• Psychology of stress, methods of self-regulation in stressful situations.

Increased attention is paid to the prevention of professional burnout of a specialist. In particular, for this

it is important to be able to psychologically distance yourself from work at a time when you are not directly involved in it, not to transfer professional difficulties to self-esteem on a personal level, maintain yourself in a “resource state”, reflect and control your negative emotional states.

The described modules can be carried out within the framework of advanced training courses for trainers, as well as in the preparation of students receiving education in the field of adaptive physical culture and sports.

Conclusion**s.** It is advisable to separate athletes with autism spectrum disorders (ASD) into a separate sports functional class, which is due to the pronounced specificity of this nosological group. Coaches working with such athletes need special training, in which psychological aspects play a key role.

In the psychological training of trainers working in this area, it is advisable to include: the study of the psychological characteristics of people with ASD; training in the development of special communication skills for working with this contingent; mastering the basic techniques of psychological support for such athletes; personal training (realization of the subjective meaning of work in this area, search for personal resources, etc.).

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Role of muscle relaxation in the correction of vestibulo-respiratory reactions in athletes

UDC 796

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Abstract

The aim of the study was to study the possibility of using muscle relaxation as a means of correcting the negative influence of vestibular loads on the function of external respiration of wrestlers. For 81 athletes-wrestlers (men) (19.41±1.66 years), the parameters of the tone of paravertebral muscles (TPM) of the reflexogenic vascular zones of C3-Th8 segments and the indices of spirometry at rest, after presentation of a vestibular load (Series-1), after the combined action of active traction rotational muscle relaxation (ATRM) and vestibular load (Series-2) were studied. It was shown that vestibular loads increase the tone of the cervical muscles in wrestlers by 4.72-11.54% ($p<0.05$). After the combined action of ATRM with vestibular loads, there was a significant decrease in myotonus at the VG15 point: up to 19.12% ($p<0.001$). In Series-2, the constants of the respiratory system significantly increased: vital lung capacity (VC) by 4.55% ($p<0.01$), maximum lung ventilation (MVV) by 6.55% ($p<0.01$) with a decrease in frequency respiration RR by 26.41% ($p<0.001$) and an increase in respiratory volume by 15.19% ($p<0.01$), which indicates an increase in the efficiency and effectiveness of breathing under conditions of vestibular loads. The method can be used in training process, sports medicine and physical rehabilitation.

Keywords: *respiratory system; vestibular load; muscle tone; athletes.*

Introduction

The problem of increasing the level of adaptation of the organism to various extreme factors is an urgent problem of sports physiology. An increase in vestibular stability in sports is of particular interest, because the vestibular analyzer, being one of the most ancient sensory systems, has a direct effect on the extrapyramidal and pyramidal systems of motor activity control, as well as on the visceral systems: respiratory, cardiovascular etc. [1].

The adaptation of athletes to specific sports loads significantly depends on their autonomic status, and, consequently, on the activity of the sympathetic and parasympathetic divisions of the autonomic nervous system. At present, various ways of directed influence on the regulation of autonomic tone are known. At the same time, pressor and physiotherapeutic effects are used on the C3-Th8 segments, which are cardio-respiratory projections of Zakharyin-Ged [2].

One of the methods contributing to the normalization of myo-visceral reflexes of the spinal cord, correction of muscle tone in the C3-Th8 segments is traction muscle relaxation: targeted effect of specially selected physical exercises, under the influence of which, stretching of the paravertebral muscles is carried out [3]. However, the question of the influence of ATRM on the adaptation of the muscular and respiratory systems of athletes-wrestlers to vestibular loads has not been studied enough.

The aim of the study was to study the possibility of using muscle relaxation as a means of correcting the negative influence of vestibular loads on the function of external respiration of wrestlers.

Material and Methods

Participants

The study involved 81 men (average age of 19.41±1.66 years), engaged in freestyle and Greco-

Table 1. Changes in muscle tone values (myotones) in segments C3-Th8 under the action of vestibular load (first series) and its effect in combination with active muscle relaxation (second series) (n=81)

Points	first set			second set		
	baseline	vestibular load	Δ%	baseline	ATRM + vestibular load	Δ%
VG15	26.0 (25.0-27.0)	29.00 (25.0-27.0)	11.54 ♦♦♦	25.68±1.78	20.77±1.97	-19.12 ***
TR15 dexter	57.77±2.31	60.50±2.22	4.72 ***	56.68±2.42	47.14±3.28	-16.84 ***
TR15 sinister	58 (55.0-60.0)	60.0 (58.0-62.0)	3.45 ♦♦	58.50±2.30	50.82±3.30	-13.13 ***
V46 dexter	57.91±2.58	60.27±1.49	4.08 ***	57.95±1.79	48.91±2.11	-15.61 ***
V46 sinister	57.91±2.62	60.36±1.65	4.24 ***	58.14±2.29	49.86±2.29	-14.23 ***

Note: VG15, TR15, V46 – points of myotonus measurement; dexter and sinister: right and left;

*, **, *** – P<0.05, 0.01, 0.001 respectively, Student's t-test;

♦, ♦♦, ♦♦♦ – P<0.05, 0.01, 0.001 respectively, Wilcoxon's W test.

Roman wrestling with 10 years of sports training experience (weight category up to 76 kg), without cardiovascular and respiratory pathology. All participants were informed about the purpose and risks of the study before they signed the written consent, and the studies were carried out in conformity with the Declaration of Helsinki.

Procedures

All athletes underwent two series of examinations (Table 1). In the first series (Series-1), the effect of vestibular loads on the functional state of the muscular and respiratory systems was studied. All examined young men were subjected to vestibular loads according to the Voyachek method [1].

The second series (Series-2) of surveys was carried out 2 weeks after the first; the same 81 people were re-examined. Before vestibular loads young men performed a set of physical exercises aimed at ATRM of the muscles of C3-Th8 segments (ATRM), which consisted in the fact that for 15 minutes in certain fixed poses the athlete performed a two-phase movement: 1) at first, stepwise increasing ATRM with the longitudinal direction of the fibers; 2) then, at the maximum of longitudinal stretching, an active rotation of the trunk was carried out to the right and to the left, effectively stretching the rotator muscles under conditions of reduced resistance of the longitudinal muscles [3].

In both series, using NOVOTEST myotonometer (Russia), the value of muscle tone was measured at point VG15, and at symmetrical paravertebral points: TR15 and V46, which are localized in the cervicothoracic spine.

With the help of the medical diagnostic complex "SFERA-4" (Ukraine), spirometric studies were carried out. The following parameters were determined: respiratory rate (RR), vital capacity (VC), tidal volume (TV), respiratory minute volume (VE), inspiratory reserve volume (IRV), expiratory reserve volume (ERV); maximal voluntary ventilation (MVV), forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1); Tiffeneau index (FEV1/VC); MVV-VE is the breathing reserve; heart rate (HR) and Hildebrant's ratio (Q = HR/RR).

Statistical Analysis

Statistical data processing was carried out using STATISTICA 10.0 software package (StatSoft Inc., USA), using parametric (Student's t-test) and non-parametric (Wilcoxon's W-test) criteria. The nature of the distribution of the values of quantitative traits was assessed using Shapiro-Wilk test. The median (Me) was used as a measure of the central tendency, and the lower (Q1) and upper (Q3) quartiles (25th and 75th percentiles) were used as scattering measures. Comparing the samples with a normally distributed trait, the arithmetic mean (M) was used as a measure of the central tendency, and the standard error of the arithmetic mean (m) was used as a scattering measure. P<0.05 was considered as statistically significant.

Results

It was found that in athletes, under the action of vestibular load and under the combined action of active muscle relaxation with vestibular load, myotonus indices and the function of external respiration change. However, these changes are multidirectional. So, under the action of the vestibular load, the myotonus at the VG15 point increased most significantly: up to 11.54% (p<0.001). After the combined action of active muscle relaxation with vestibular load, there was a significant (p<0.001) decrease in myotonus at VG15 point: up to 19.12% (Table 2).

Under the influence of vestibular load, the following changes in external respiration function occurred:

Table 2. Changes in the values of spirometry indicators in athletes under the action of vestibular load (first series) and its effect in combination with active muscle relaxation (second series) (n = 81)

Parameters	first set			second set		
	baseline	vestibular load	Δ %	baseline	ATRM + vestibular load	Δ %
spirometry indicators						
pulmonary volumes						
TV (l)	0.84±0.37	0.79±0.31	-5.44	0.73 (0.52-1.06)	0.95 (0.69-1.24)	30.31 ♦♦♦
IRV (l)	2.15 (1.85-2.55)	2.08 (1.92-2.42)	-3.35	2.23±0.48	2.28±0.52	2.05
ERV (l)	0.77±0.40	0.70±0.37	-9.17	0.71 (0.62-0.38)	0.70 (0.55-0.96)	-2.32
pulmonary capacity						
VC (l)	4.17 (3.87-4.68)	4.17 (4.09-3.83)	0.18	4.29 (4.16-3.76)	4.36 (3.91-4.86)	1.47 ♦♦♦
IC (l)	2.95 (2.67-3.23)	2.93 (2.90-2.71)	-0.56	3.03±0.53	3.23±0.52	6.41 **
RR (in/min)	18.92±3.44	21.52±4.15	13.75 ***	19.40 (16.56-23.79)	15.96 (15.03-19.20)	-17.71 ♦♦♦
MVV (l/min)	70.00 (42.00-124.50)	62.00 (32.50-119.00)	-11.43 ♦	66.50 (37.50-102.50)	118.50 (97.00-147.00)	78.20 ♦♦♦
V_E (l/min)	13.68 (11.54-17.45)	15.22 (12.65-19.55)	11.31	13.76 (12.11-16.87)	13.76 (11.66-17.19)	0.04
MVV-VE (%)	78.50 (72.00-87.50)	72.50 (58.00-84.00)	-7.64 ♦♦	75.00 (62.00-83.50)	87.00 (82.50-91.00)	16.00 ♦♦♦
pneumotachometry indicators						
FVC (l)	4.07 (3.74-4.66)	4.06 (3.71-4.47)	-0,.8 ♦	3.98 (3.68-4.46)	4.20 (3.78-4.57)	5.31 ♦♦
FEV1 (%)	3.64 (3.35-3.94)	3.57 (3.30-3.89)	-1.86	3.52±0.54	3.72±0.49	5.70 *
respiratory function indices						
FEV1/VC (%)	85.50 (80.00-91.50)	85.00 (80.50-91.50)	-0.58	83.06±12.18	83.42±7.79	0.43
Q (c.inu.)	3.24±0.72	2.66±0.51	-17.82 ♦♦♦	3.20±0.87	3.55±0.74	10.88 **

Note: respiratory rate (RR), vital capacity (VC), tidal volume (TV), respiratory minute volume (VE), inspiratory reserve volume (IRV), expiratory reserve volume (ERV); maximal voluntary ventilation (MVV), forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1); Tiffeneau index (FEV1/VC); MVV-VE is the breathing reserve; heart rate (HR) and Hildebrant's ratio (Q = HR/RR). *,**,*** – P<0.05, 0.01, 0.001 respectively, Student's T-test; ♦, ♦♦, ♦♦♦ – P<0.05, 0.01, 0.001 respectively, Wilcoxon's W-test.

RR increased by 13.8% (p<0.001), MVV decreased by 11.43% (p<0.05), MVV-VE decreased by 7.64% (p<0.01), FVC decreased by 0.18% (p<0.05), Q decreased by 17.82% (p<0.001) (Table 3). The effect of the combined action of active muscle relaxation with vestibular load manifested itself in a significant decrease in comparison with the initial RR level: by 17.71% (p<0.001).

These changes were accompanied by an increase in TV by 30.31% (p<0.001), VC by 1.47% (p<0.001), IC by 6.41% (p<0.01), MVV by 78.20% (p<0.001), RR by 16.0% (p<0.001), FVC by 5.31% (p<0.01), FEV1 by 5.71% (p<0.05) and an increase in Q values by 10.88% (p<0.01) (Table 2).

Discussion

The results show that the vestibular load and its combination with active muscle relaxation have a multidirectional effect on the functional state of the muscular and respiratory systems of athletes. Background studies of the spirogram of athletes indicate a high level of their physical development: good condition of the lung tissue, normal chest mobility, sufficient

strength of the respiratory muscles and good airway patency. The initial indicators of myotonometry indicate the presence of hypertonicity of the paravertebral muscles in the cervicothoracic spine, since wrestlers pay increased attention to training these zones [3].

In the course of the work, it was revealed that the vestibular load increases the tone of the cervical muscles even more, which is confirmed by a number of studies [3]. Noteworthy is the fact that VG15 point is most sensitive to the vestibular load ($p<0.001$). This point is located between I and II cervical vertebrae, above the posterior border of hair growth. McCall A.A., Miller D.M., Yates B.J. showed that the greatest flow of impulses to the lateral vestibular nuclei comes precisely from the structures of the neck-osteo-ligamentous, articular and muscle receptors [4]. The action on this point of acupuncture methods leads to an improvement in the condition of the vestibular apparatus.

Attention is drawn to the pronounced degree of the negative effect of vestibular load on the function of external respiration of athletes. In our studies, the use of vestibular load led to a clear mismatch in the activity of the visceral systems, which manifests itself in a significant decrease in Q. Obviously, this change is the cause of a decrease in the reserve breathing capacity, breathing reserve and an increase in RR, which were accompanied by a tendency towards a decrease in FVC (Table 2). The observed changes negatively affect the efficiency of respiration, and, given the decrease in HR, are the result of activation of the parasympathetic division of the autonomic nervous system.

The effect of active muscle relaxation on the function of external respiration of athletes is manifested in the opposite way. There was an improvement in the coordination of the autonomic nervous system divisions (Q growth), which was accompanied by HR stability. Obviously, as a result of this, in athletes compared with the initial level, despite the effect of vestibular load, there was a significant decrease in RR with an almost unchanged VE level. An increase in the efficiency of external respiration is also indicated by an increase in VC, FVC, MVV and respiratory reserve (Table 2).

Conclusion

Vestibular loads lead to an increase in muscle tone in the C3-Th8 segments, as well as to a decrease in the efficiency and economy of the external respiration system. The implementation of the ATRM complex significantly reduces the negative effect of vestibular loads on the respiratory functions of wrestlers.

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Media strategies of professional football clubs

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Abstract

Objective of the study – article attempts to analyze the functionality of club media of leading Russian and European football clubs. In particular, the material includes a reasoned, case-based assumption about the need for a media component in the structures of such organizations, regardless of their status.

The concept of the article was determined by fundamental and applied research in the field of sports communications and sports journalism. These include the works of K. Alekseev and S. Ilchenko, S. Mikhailov and A. Mostov, E. Votik, M. Danilova, M. Vishnevsky, I. Tkachev, I. Lyulevich and V. Kostikov.

The interdisciplinary nature of the study led to the application of a systematic approach using the method of analysis (structural and comparative) and generalization. The authors identify the status of football clubs as subjects of sports media communication, review the media assets of football clubs in Russia and abroad, identify the main channels and tools of interaction between clubs and fans. The main conclusion is the thesis about the inevitability of the functioning of a modern football club as an effective media company, including for the construction and development of a club brand.

Keywords: *club media, sports media communications, mass media, football brands, information technology, advertising, media sports, sports organizations, journalism.*

Introduction. The relevance of the study is due to the following factors.

Firstly, modern sport is increasingly seen as a media communication phenomenon that forms a significant share of news, entertainment and advertising content. As a result, the emergence of the concept of "media sport", which includes both the communication of states in the space of sports and politics, and the communication of sports fans and media, and the communication of sports and journalistic communities.

In other words, there is currently a dynamic process of involving traditional and new media in the production of content that forms an active dialogue with the audience and subjects of the sports industry.

In this regard, the main tools for the successful positioning of a football club in the communication environment are the systems of club media that implement a certain long-term strategy for the development of the club as a commercially successful project.

Secondly, the target audiences of football clubs cease to be passive participants in communication processes. Fans realize their activity by performing personal marketing actions in the information space, thereby forming the content of a particular action or campaign emanating from the club. The effectiveness of such a model is manifested in the creation and development of fan media.

Thus, there is a process of development of a relatively new phenomenon in the football industry – the active positioning of clubs as media companies.

The relevance and novelty of the study is expressed in the identification of the status of football clubs as subjects of sports media communication, the review of the media assets of football clubs in Russia and abroad, the designation of the main channels and tools for the interaction of clubs with fans.

The concept of the article was determined by fundamental and applied research in the field of sports

communications and sports journalism. These include the works of K. Alekseev and S. Ilchenko, S. Mikhailov and A. Mostov, E. Votik, M. Danilova, M. Vishnevsky, I. Tkachev, I. Lyulevich and V. Kostikov.

The purpose of the research. The main purpose of this work is to analyze the functionality of club media of leading Russian and European football clubs.

In particular, the material includes reasoned, case-based theses that allow us to identify the pros and cons of the information activities of modern football clubs and suggest the need for a media component in the structures of such organizations, regardless of their status.

Methodology and organization of the research. The interdisciplinary nature of the study led to the application of a systematic approach using the method of analysis (structural and comparative) and generalization.

During the work on the article, the structures of the club media of the leading European teams (Russian "Zenit", English "Liverpool" and Spanish "Barcelona"), as well as teams playing in the third most important leagues (Russian "Alania Vladikavkaz", English "Wimbledon" and Spanish "Recreativo") were analyzed.

Research results and their discussion. The peak of club media development occurred in the second half of the XX century. And if at the first stage football organizations focused mainly on active fans, then in subsequent years "the focus of attention gradually shifted towards passive (potential) sports fans and professionals" [2. P. 123]. Thus, there was a gradual process of involving the maximum number of people in the football industry.

In the late 1980s, the situation changed. Private media companies were actively developing, which led to an increase in revenues from television rights. Business managers came to football, and for the first time they began to focus on marketing and media communication. According to V. Kostikov, this has dramatically affected the growth of income and attractiveness of clubs in the global market [4, P. 51].

In recent years, another trend has emerged – a relatively new trend has been added to the existing factors: the development of own club channels of interaction with the audience, which allows you to study the characteristics of fans and form targeted offers for them. Thus, a modern club is a kind of channel (tool) of access to a huge and loyal audience for partner brands.

In our opinion, the following types of club media prevail in modern sports organizations: status projects (press services, official websites, publishing houses); online stores (websites and applications for the sale of club paraphernalia); media for fans (radio and TV channels, magazine periodicals); fans' media (online and offline fanzines and online communities); pages in social networks, channels in messengers and on video/audio platforms; personal media of players.

In addition, the club's media assets also mean the availability of financial and other instruments to influence the nature and frequency of mentions of the team in the media that are not part of the structure of the football organization.

For example, it is no secret that the most influential daily sports newspaper "Marca" sympathizes with the "Real" (Madrid) and mercilessly criticizes "Barcelona". In the Catalan editions of "Mundo Deportivo" and "Sport", on the contrary, materials about "Barcelona" predominate, and articles about "Real" are exclusively negative and ironic. In Russia, the specifics of the relationship between "Zenit" (St. Petersburg) and "Match-TV" (sports TV-channel, owned by "Gazprom-Media"), are being discussed.

Anyway, according to K. Alekseev and S. Ilchenko, "a football club is an actual sports newsmaker, creating at least one news event per week" [1, P. 69]. Moreover, club news is often associated not only with professional activities, but also with indirect sports events in the social sphere.

In any case, it should be noted that often the amount of media assets depends on the form of ownership of a football club, as well as the level of its financial well-being. Obviously, the richer the football club, the more funds are invested in its information activities.

However, if we talk about the qualitative measurement of the functioning of the club as a subject of sports media communication, big money does not always ensure the effectiveness of media assets. Moreover, there are many cases demonstrating situations in which the lack or lack of funds for the development of club media involves active experiments with alternative and accessible communication tools and the conceptual and thematic content of the information product. In addition, it is easier to manage a small number of club media, such structures are more flexible and are able to respond in a timely manner to information occasions and media conjuncture.

Currently, many people in Russia underestimate the potential of club media, "focusing on more linear and obvious development issues" [3]: buying and sell-

ing players, seeking funding from state or regional budgets.

Only "Zenit" and partially "Spartak", "Lokomotiv" and "Krasnodar" have a systematic way of working with the audience through media and social networks. In most clubs, "projects in the information environment, ranging from match protocols and working with journalists to SMM and shooting videos, are handled by the press attache in the singular" [3]. As a result, there is a decrease in interest in national tournaments.

Russian clubs (with the exception of "Zenit" and "Krasnodar"), being financially dependent on the state, are focused on the domestic audience.

In this sense, the approach of European clubs is systematic and global. For example, "Liverpool" and "Barcelona" are clubs that have a huge international audience and strive to expand it.

This is evident even in the nature and frequency of the use of club media as channels for the distribution of advertising messages. In this case, several main directions should be distinguished: advertising on the club TV channel, in magazines and pre-match programs; advertising on the official website, affiliated resources, in social networks and mobile applications; game advertising (advertising the club in esports products); souvenir advertising and advertising on clothing.

The largest volume is occupied by advertising sponsors and media partners actively promoting the club brand. Most clubs with a global audience of fans have special departments to protect the club brand.

This observation is true both in relation to the world's top clubs and local level clubs – not only well-known teams strive for popularity. Small clubs often pay off due to the love of the local audience. For example, not the most famous and successful clubs "Wimbledon" (England) and "Recreativo" (Spain) effectively survive by concentrating on the environment of local fans.

The specifics of the media product in football depend on the specifics of clubs as organizations. The first feature is that any club media product is somehow used to achieve sports results.

If the sports component itself is not similar to other business areas, then from the point of view of marketing it is necessary to proceed from the features of the media product. And football clubs have quite a variable one.

The information product is based on everything related to the club: traditions, history, positioning. At this level, the interaction of the club with the main consumers of its media content (fans) is much deeper than in classical business models. Fans rarely change their club preferences.

In a sense, the football matches themselves and their broadcasts are a media product. The increase in club income at this level is realized through competent stadium merchandising, the sale of paid subscriptions to TV broadcasts and club video channels.

According to a study by "Deloitte", in 2021, the Russian Premier League accounted for only 6.4% of revenue on match days, while sponsorship and other commercial revenues of clubs reached 61% [6].

At the same time, in Europe in the same year, according to UEFA, revenues on match days accounted for 14.4% of all football revenue, and sponsorship brought only 31%. The main share of income to European clubs was brought just by the sale of television rights – 37% [6].

Football clubs form their audience by functioning like classic media companies. Fans are presented with various information services – club TV channels, radio, websites, pages in social networks, paper and online magazines, fanzines, pre-match programs, mobile applications, channels in messengers. Monetization is implemented through the presentation (sale) of data to such an audience to potential sponsors, investors and business partners. Thus, fans are the main media asset of football clubs, regardless of their level and results.

In addition, the analysis of the media assets of professional football clubs allows us to identify some trends.

In particular, the combination of media and non-media assets (channels) in the football brand communication model contributes to effective interaction with target audiences. "Club content of news and event character not only reacts to various information flows, but also forms public opinion, as well as reputational and image components of the brand" [5, P. 54].

Conclusions. Based on the results of the study, the following conclusions were formulated.

Firstly, the development of information processes related to football leads to the fact that football tournaments become global events (media events). New media play a decisive role in the mediatization of football. This is largely due to the fact that the audience goes online, and new technologies allow packaging and distributing content mobile and in convenient formats.

Secondly, big money does not always ensure the effectiveness of media assets. And vice versa - the

lack or lack of funds for the development of club media implies active experiments with alternative and accessible communication tools and conceptual and thematic content of the information product.

Thirdly, the media product of football clubs is quite variable. It is based on everything connected with the club: traditions, history, positioning. At this level, the interaction of the club with the main consumers of its media content (fans) is much deeper than in classical business models.

Fourthly, football clubs "form their audience by functioning as classical media companies" [3] – they create and distribute unique media content, increasing the audience due to its quality and quantity, and also implement joint media projects with various media and other subjects of sports communication.

And, finally, fifthly, the analysis of the information activities of the subjects of the Russian segment of the football industry allows us to formulate a conclusion about the need to intensify the further development of club media with an emphasis on the specifics of the internal audience and taking into account those media strategies that are successfully implemented in the practice of European clubs.

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Relationship between indicators of motor activity and physical workability of primary school students

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Abstract

Objective of the study was to reveal the relationship between indicators of motor activity and physical performance of primary school students.

Methods and structure of the study. The experiment involved 60 primary school students in Belgorod and the Belgorod region. In the course of the study, the physical performance of primary school students was determined according to the one-stage step test PWC_{170} and the value of the pulse debt accumulation index (PDI). The shagometry method consisted in counting the number of movements of primary school students during the day. To obtain objective data on the average daily volume of physical activity of students, fitness bracelets with a pedometer function were used. To determine the presence or absence of a linear relationship between the indicators of motor activity and physical performance of primary school students, the method of parametric statistics was used - the Pearson correlation coefficient.

Results and conclusions. The results of the correlation analysis made it possible to state the absence of influence on the improvement of the indicators of physical performance of younger schoolchildren only by the volume of physical activity. The solution to this problem is possible by changing the nature and intensity of physical activity of students during organized at school during the school day and independent physical education classes.

Keywords: *motor activity, physical performance, hypokinesia, primary school students, full-time school.*

Introduction. Hypokinesia in childhood, as noted by S.V. Grudina interferes with the normal and timely development of the functional capabilities of their growing organisms. Inhibition in the development of organs and structures of the body leads to the development of various deviations [2].

Educational opportunities, intellectual and motor abilities of children of primary school age largely depend on the level of development of physical and mental performance. Younger schoolchildren with a high level of working capacity study well at school, get sick less and miss classes. In addition, high working capacity allows them to master various skills, habits, methods of action without stress, ensures the development of physical and moral-volitional qualities [1].

Objective of the study was to reveal the relationship between indicators of motor activity and physical performance of primary school students.

Methods and structure of the study. The experiment involved 60 primary school students in Belgorod and the Belgorod region. In the course of the study, the physical performance of primary school students was determined according to the one-stage step test PWC_{170} and the value of the pulse debt accumulation index (PDAI). The shagometry method consisted in counting the number of movements of primary school students during the day. To obtain objective data on the average daily volume of physical activity of students, fitness bracelets with a pedometer function were used. To determine the presence or absence of a linear relationship between the indicators of motor activity and physical performance of primary school students, the method of parametric statistics was used - the Pearson correlation coefficient.

Results of the study and their discussion. Determination of indicators of the average daily volume of physical activity and physical performance of primary school students was carried out in schools in Belgorod and the Belgorod region with different working hours (Table 1). Thus, in a full-time school (school

Table 1. *Indicators of motor activity and physical performance of primary school students*

Indicators	school 1, M ± m	school 2, M ± m	t	p
Volume of physical activity	12957±749	10095±312	3,53	<0,01
PWC_{170}	327,38±11,75	362,9±15,9	1,79	>0,05
Pulse Debt Accumulation Index (PDAI)	1,123±0,048	1,261±0,062	1,75	>0,05

1), the average daily volume of physical activity of junior schoolchildren was 12957 steps/day, which is significantly higher than this indicator by 2862 steps/day for students studying in a regular school ($p<0.01$).

According to academician A.G. Sukharev, the daily rate of motor activity for children aged 6–10 years is 15,000–20,000 steps/day [3]. When comparing the revealed indicators of the average daily volume of motor activity of students of both schools with the daily norm of motor activity of children of this age, it can be noted that even in a full-time school, elementary school students are not provided with an optimal motor regime that would satisfy the daily need for movement of younger students.

The determination of the general physical performance was carried out according to the modified method of L.I. Abrosimova. The revealed indicators of PWC_{170} and PDAI indicate that the results of the single-stage step test are within the normal range for children of this age and do not have significant differences between students in the elementary grades of a full-time school and a regular school.

In order to determine the presence or absence of a linear relationship between the indicators of motor activity and physical performance of primary school students, a correlation analysis of the data obtained was carried out (Tables 2, 3). The revealed results indicate a weak correlation at a non-significant level of significance between the indicators of the volume of physical activity and PWC_{170}, the volume of physical activity and PDI ($p>0.05$) of primary school students in both schools.

It should be noted that the indicators of the volume of physical activity of students in a full-time school are significantly higher than this indicator of students in a regular school, but they also have a weak correlation between indicators of physical activity and physical performance. This fact can be explained by the fact that in junior schoolchildren, an increase in physical performance indicators is possible not only by increasing the volume of motor activity, but also by changing its nature and intensity during organized at school during the school day and independent physical education classes.

Conclusions. As a result of the study, it was revealed that the indicators of the average daily volume of physical activity of students from both schools are lower than the daily norm of motor activity of children of this age. The conducted correlation analysis indicates a weak correlation between the indicators of the volume of physical activity and physical performance of primary school students in both schools ($p>0.05$).

The solution to this problem is possible by changing the nature and intensity of physical activity of students during organized at school during the school day and independent physical education classes.

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Table 2. *Interrelation of indicators of motor activity and physical performance of primary school students (school 1)*

Coefficient correlations	PWC_{170}	PDI
r	0,07	0,05
p	>0,05	>0,05
connection strength	weak	weak

Table 3. *Interrelation of indicators of motor activity and physical performance of primary school students (school 2)*

Coefficient correlations	PWC_{170}	PDI
r	0,32	0,1
p	>0,05	>0,05
connection strength	weak	weak

Management of physical culture and health improving activities in the higher education institution based on the project approach

UDC 37.013

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Abstract

Objective of the study was to identify the attitude of teachers and researchers to the possibilities of implementing project management in the conditions of the sports and educational space of the university.

Methods and structure of the study. The sociological study covered seven universities in the Belgorod, Kursk, Lipetsk regions, consisted of a questionnaire survey of the main actors in the sports and educational space of the university and their in-depth interviewing using the focus group method. The study involved 300 teachers and researchers of the university, 140 employees of the university administration. The purpose of the empirical sociological study was to identify the characteristics of the respondents' dispositions regarding the application of the technology of the project approach.

Results and conclusions. To apply the project management technology in the development of the sports and educational space of the university, it is necessary to overcome a number of barriers by involving participants in long-term pilot projects that do not require fundamental changes in the employee's activities. As the main problems that arise in the course of applying the project approach to managing the development of sports and recreational activities, the following were identified: 1) lack of consistency and consistency in the processes of introducing management methods; 2) insufficient theoretical training of management personnel; 3) insufficient level of formalization of project management processes. Overcoming the barriers to the application of project management technology is possible through the involvement of participants in physical culture and recreation activities in long-term pilot projects that do not require cardinal changes in the employee's activities.

Keywords: *sports and educational space of the university, sports and recreational activities, project management technology, dispositions, teachers and researchers of the university, employees of the university administration.*

Introduction. Within the framework of the system approach, the management of the development of the sports and educational space of the university (SESU) is a coordinated coordinated activity of various institutions, the purpose of which is to ensure the optimal development of all elements of the sports and educational space and the system as a whole. In the process of managing the development of the sports and educational space of the university, one should take into account: 1) the specifics of the relationship between its subjects; 2) the level of structure and material equipment of the SESU; 3) educational (training) programs, areas of training, special courses and other scientific and methodological components; 4) motivational elements and value aspects of the activities of actors in the SESU [1].

The expediency of applying the project approach to managing the development of the sports and educational space of the university is determined by a number of circumstances, among which are: the creation in the process of working on the project of conditions for the subject to rethink his dispositions; expansion of the space of freedom of choice by the subject of norms of behavior; increasing opportunities for interaction between representatives of various institutions; the formation among the designers of a sense of the

reality of change, including changes in their own value-target settings; the emergence of additional motivation for actors to change their dispositions as a result of the expectation of a reward for a successful project [5]. However, the effectiveness of the application of project management technology in the process of developing the sports and educational space of the university directly depends on the peculiarities of the attitude of teachers, researchers and employees of the university administration towards it.

Objective of the study was to identify the attitude of teachers and researchers to the possibilities of implementing project management in the conditions of the sports and educational space of the university.

Methods and structure of the study. The article presents the data obtained in the course of the sociological study "Diagnostics of the management system of the sports and educational space of universities" (2018-2021). Study area: Belgorod, Kursk and Lipetsk regions. Research methods: 1) Questionnaire survey of SESU actors: university professors and researchers (n=300), university administration employees (n=140); 2) focus group interviews: university professors and researchers (n=12) and university administration employees (n=12).

Results of the study and their discussion. Among teachers and researchers, the level of knowledge in the field of project management is insufficient. It is rated as "high" by 6.3% of the respondents, as "medium" – by 35.3%, as "low" – by 29.7%. A complete lack of knowledge about project management technology was found in 7.7% of respondents.

Despite this, a significant part of the respondents highly appreciated the prospects for the use of project technology (7.3 points out of 10 possible). As expected, the indicator of its assessment is much higher in those universities where the practice of its implementation has developed.

Almost 39% of teachers and researchers point out among the advantages of project management technology the possibility of increasing the efficiency of implementing the goals and objectives. 27.7% see its advantage in increasing personal responsibility and productivity; 7% - in increasing the initiative of university staff. At the same time, among teachers and researchers, only 52.3% have any information about the practice of the project approach to managing the development of the sports and educational space of the university (SESU). And only 48% of respondents have personal experience in the implementation of projects in the field of SESU. Consequently, an attempt to highlight the advantages of the project approach to managing the development of the SESU in a significant part of the respondents is rather abstract.

Teachers and researchers who did not take part in the implementation of projects in the field of SESU, as the main barriers to this, indicate the fear of destroying the established foundations, habits and principles of activity in the field of SESU. This opinion is shared by 22.3% of the respondents. 18.7% indicate an insufficient level of readiness for change; 14% - on the desire to function in the previous mode.

The employees of the administration of the university show some restraint regarding the effectiveness of the project approach to managing the development of the SESU, estimating it at 6.6 points out of 10 possible. It should be noted that the evaluation of the effectiveness of the project approach to managing the development of the SESU among the administration employees is somewhat lower compared to the opinion of the teachers and staff of the university. We are inclined to explain the restrained attitude towards the use of this technology by the experience of management among the employees of the administration of the university. The employees of the administrations of higher educational institutions that have a number of ongoing and/or completed projects for the development of the SESU are highly appreciated.

The use of a project-based approach to managing the development of the SESU, according to university administration employees, is dictated by the prospects for increasing the initiative of employees (35.7% of respondents), enhancing the efficiency of implementing the goals and objectives (33.6%), increasing personal responsibility and labor productivity (15. 7%).

Among the most significant barriers that arise in the course of applying the project approach to managing the development of the SESU, 32.9% of the employees of the university administration consider the lack of consistency and consistency in the processes of introducing management methods. This barrier is considered real by a number of researchers, for example, according to E.N. Ivakhnenko, "the modern education system experiences regular external directive interference, which inevitably forms a gap in continuity in its development" [2].

In the work "Education Management" V.P. Panasyuk notes that "one can talk about the systemic and balanced management of education and educational systems in a positive way, if the levels of complexity of

the managing and managed systems are observed; if the highest (federal and regional) levels of education management do not have to "manually" solve problems that are, in essence, the powers of municipal authorities and management of educational organizations" [4]. The researcher comes to the conclusion that the imperfection, inconsistency and frequent updating of legislation make it impossible to make effective decisions.

The main problem of 30.7% of respondents consider the fuzzy distribution of functional duties. Another 10.7% of respondents note insufficient theoretical training of management personnel. This barrier is real according to many researchers of the management system in the field of education. V.N. Startseva, in particular, emphasizes the need for a continuous training process for university administration employees, which is used to improve the professional competence of employees [6].

Among the employees of the university administration, 10% highlight the insufficient level of formalization of project management processes. The presence of this barrier is confirmed by other researchers. So, A.S. Mudunov and K.N. Tsakhaeva come to the conclusion not only about the insufficient level, but also about the complete absence of formalization of project management processes [3].

Nevertheless, despite the listed barriers, university administration employees consider project management technology to be promising and have great potential.

Conclusions. It has been established that the application of project management in the development of the sports and educational space of the university is impossible without the close interaction of all its participants. The possibilities of using project management directly depend on the degree of interest in this technology of all participants in the sports and recreation activities of the university. The level of demonstrated interest directly depends on the degree of involvement of the participants in the work with the project. Teachers and employees of the administration, who personally participated in the development of sports and recreational activities, using the technology of project management, treat it with greater loyalty.

As the main problems that arise in the course of applying the project approach to managing the development of sports and recreational activities, it seems possible to determine the following: 1) lack of consistency and consistency in the processes of introducing management methods; 2) insufficient theoretical training of management personnel; 3) insufficient level of formalization of project management processes.

Overcoming the barriers to the application of project management technology is possible through the involvement of participants in physical culture and recreation activities in long-term pilot projects that do not require cardinal changes in the employee's activities.

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Involving students to independent lessons in physical culture

UDC 796.01

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Abstract

Objective of the study was to substantiate ways to increase the efficiency of attracting university students to independent physical education classes.

Methods and structure of the study. Scientific work was carried out in 2020-2021 on the basis of the Belgorod State National Research University. The study used the analysis and generalization of scientific literature, a survey of students, in which 4399 students of the Belgorod State National Research University took part (3212 of them were girls and 1187 boys), an experiment, methods of mathematical statistics.

Results and conclusions. As a result of the survey, the reasons for which students do not engage in physical culture were identified. Taking into account the survey data, a system was developed to involve students in independent physical education classes based on the methodology for the integrated development of basic physical qualities, including exercises that do not require sophisticated equipment or visits to fitness centers; the ability to use the means of developing physical qualities that are within the power of a particular student and in which an increase in indicators will invariably be observed, which will ensure the creation of a situation of success; the presence in the information space of video instructions for organizing the process of physical training; the possibility of prompt consultation with specialists (as part of physical education classes, in a group in social networks or in individual contact through social networks); the presence of an incentive system, which includes a set of moral and psychological support of the individual for independent physical education.

Keywords: *independent physical culture lessons, physical readiness, methods of students' physical training.*

Introduction. Numerous studies have proven that motor physical activity is an integral component of a healthy lifestyle. High health indicators, in turn, provide a person with the opportunity to realize themselves in professional activities. Attracting students to independent physical education is one of the missions of the educational space of the university [2].

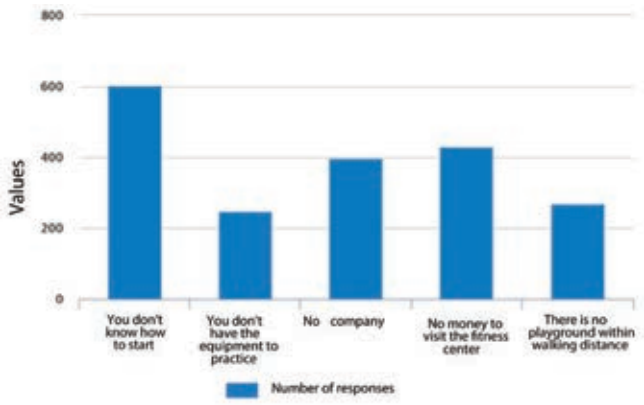
Objective of the study was to substantiate ways to increase the efficiency of attracting university students to independent physical education classes.

Methods and structure of the study. Scientific work was carried out in 2020-2021 on the basis of the Belgorod State National Research University. The study used the analysis and generalization of scientific literature, a survey of students, in which 4399 students of the Belgorod State National Research University took part (3212 of them were girls and 1187 boys), an experiment, methods of mathematical statistics.

Results of the study and their discussion. As a result of the survey, it was found that about half of the students lead a fairly active lifestyle, and are engaged in various forms of physical culture twice a week or more often. Of the remaining half, the third part is engaged less than once a week, and the third is not engaged at all. The most common reasons why students do not do physical education or do it rarely are shown

in the figure. The survey results showed that 28% of students do not know how to start their physical education classes, 20% do not have money to visit fitness centers and 18% do not have a company for physical education. For 12% of students, the problem lies in the lack of sports grounds within walking distance, and for 12% - in the absence of the necessary equipment for classes.

It was found that it is necessary to develop a system for introducing students to independent physical education classes, taking into account their needs. The main content of the proposed system was directly the process of physical training of students. The development of this system began in the 2020-21 academic year. Its main component is the method of complex development of basic physical qualities. Taking into account the results of the survey, the exercises were selected in such a way that their performance did not require additional equipment, visits to specialized halls, but it was possible to do everything at home or in a yard sports ground.



Reasons for the lack of independent physical exercises among students

A feature of the methodology is that the proposed exercises are selected taking into account the individual indicators of students' physical fitness. So, for example, if a student can perform pull-ups on a high bar, then he performs these exercises to develop strength abilities. If the exercise is beyond his strength, then as a means to develop strength, he uses pull-ups in the hanging position lying on a low bar 90 cm high. If this exercise is also difficult, then the height of the crossbar for performing pull-ups in the lying position increases. Thus, such means of developing physical qualities are selected that are within the power of a particular student and in which an increase in indicators will invariably be observed as training progresses, that is, a situation of success is created.

For a complex impact on the development of all physical qualities, the exercises included in the content of the GTO complex were taken as the basis: pull-ups, flexion and extension of the arms in a lying position, long jumps from a place, lifting the torso from a prone position, bending to develop flexibility, slow running.

A characteristic feature of the technique is its maximum simplicity and accessibility. An example would be such a recommendation for execution as it is necessary to perform 30 repetitions of a certain exercise in any number of approaches. The rest pause between sets is one minute. As you train, you should strive to ensure that a given number of repetitions is performed in fewer approaches.

An effective condition for the implementation of the methodology is its placement in quick access on social networks. A special project "Training is easy" was created, which presents recommendations for organizing self-study [3]. The use of social networks allows students to receive prompt advice from specialists on the organization of independent physical training. Relying on the exercises of the GTO complex allows you to constantly assess your own level of physical fitness based on state requirements.

The simplicity and accessibility of the exercises included in the methodology makes it possible for students to conduct independent classes both at the sports facilities of the university and in conditions of isolation caused, for example, by pandemic restrictions. To encourage students to self-study, moral and psychological incentives were used: social and personal significance, perspectives, examples, competitions, control, encouragement (the ability to get a credit in physical culture subject to regular classes for any progress in the level of physical fitness), etc.

Conclusions. The conducted research allows us to state that for the effective involvement of students in regular physical education classes in order to increase the level of physical fitness, a comprehensive and systematic approach is needed, which involves a number of mandatory components associated with the presence of: no complex equipment or visits to fitness centers are required; incentive system, including a set of moral and psychological incentives to support a person for independent physical education; with the ability to use adequate means of developing the student's physical qualities, in which there is an invariable

increase in indicators that ensure the creation of a situation of success; with the presence in the information space of video instructions for organizing the process of physical training; with the possibility of prompt consultation with specialists (as part of physical education classes, in a group in social networks or in individual contact through social networks).

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Assessment of professionally-applied physical fitness of young men with mild intellectual impairments

UDC 376.42

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Abstract

Objective of the study was to evaluate the professional-applied physical fitness of young men with mild intellectual disabilities.

Methods and structure of the study. The experiment involved 174 young men with mild intellectual disabilities, graduating from the 9th grade of special (correctional) schools in the Perm Territory. Assessment of professionally applied physical fitness was carried out using the method of control tests. The list of tests was determined in accordance with the work program for adaptive physical education, developed on the basis of the requirements of the Federal State Educational Standard for the education of students with intellectual disabilities.

Results and conclusions. The most significant physical qualities for young men with mild intellectual disabilities, which determine the success of their professional activities, include: strength endurance and coordination abilities. The formation of these physical qualities will be facilitated by the methodology of professionally applied physical training, based on the use of exercises with BOSU and Super Pump simulators.

Keywords: *adaptive physical education, intellectual disorders, professionally applied physical training, strength endurance, coordination abilities.*

Introduction. Professional and applied training of students with mild intellectual disabilities, carried out in special (correctional) schools, plays a very important role in their further successful socialization, introduction to work, preparation for independent life, opening up opportunities for obtaining a profession and employment [1, 6]. It involves complex long-term work, in which teachers, employers and invited representatives of various professions take part [2, 6]. Obtaining general labor skills and abilities enables students to plan their activities, control and regulate the process of its implementation, which will be useful in any profession in the future [2, 3].

More than 80% of professions recommended for people with mild intellectual disabilities are associated with high physical activity, which leads to high requirements for their level of physical fitness [2, 4, 5].

At the same time, researchers point to the insufficient volume of professionally applied physical training, provided for by the main professional educational program and adaptive physical education programs in special (correctional) schools, especially in high school [1, 5, 6]. These facts determined the direction of our research.

Objective of the study was to evaluate the professional-applied physical fitness of young men with mild intellectual disabilities.

Methods and structure of the study. In the course of the study, methods of analysis and generalization of data from scientific and methodological literature, the method of professiography were used. With the help of the method of control tests, the assessment of professional-applied physical fitness of young men with mild intellectual impairment was carried out (174 students graduating from the 9th grade

of special (correctional) schools in the Perm Territory).

Results of the study and their discussion. The study of professional standards and requirements of professions recommended for persons with mild intellectual disabilities made it possible to identify the most important professional qualities, including physical ones, which are necessary for their successful implementation (Table 1).

The conducted research made it possible to determine that the most significant physical qualities for people with mild intellectual disabilities, which determine the success of their professional activities, include: strength endurance and coordination abilities.

174 young men with mild intellectual disabilities, graduating from the 9th grade of special (correctional) schools of the Perm Territory, took part in the study on the assessment of professionally applied physical fitness. Assessment of professionally applied physical fitness was carried out using the method of control tests. The list of tests was determined in accordance with the work program for adaptive physical education, developed on the basis of the requirements of the Federal State Educational Standard for the education of students with intellectual disabilities.

The results of the study are presented in table. 2.

When analyzing the results, we noticed that in two control tests ("Romberg's test" and "Tempo-rhythmic assessment"), young men with mild intellectual disabilities could not even reach the standard value.

In all other control tests, the average values are close to the lower limit of the normative range, which indicates an insufficient level of professional-applied physical fitness of young men with mild intellectual disabilities, graduating from the 9th grade of special (correctional) schools in the Perm Territory.

The study made it possible to reveal the existing contradiction between the low level of professional-applied physical fitness of young men with mild intellectual disabilities and the requirements for the level of development of professionally important physical qualities (primarily coordination abilities and strength endurance) imposed on workers in professions recommended for persons with mild intellectual disability.

To overcome this contradiction, in our opinion, the technique of professionally applied physical training of young men with mild intellectual disabilities, aimed at the formation of their coordination abilities and strength endurance, can contribute.

As a means of the methodology, we propose to include exercises with the BOSU simulator and exercises performed on the coordination ladder for the development of coordination abilities, and Super Pump exercises for the development of strength endurance.

Table 1. *Requirements of professions recommended for persons with mild intellectual disabilities*

Content of work	Must know	Must be able	Professionally important qualities
Painter			
Preparing surfaces for plaster, applying solutions to the wall surface and leveling plaster, surface finishing, etc.	Types and properties of solutions, technology and methods of plastering; quality requirements, etc.	Prepare mortars for plastering, prepare surfaces for plastering, work with special tool.	Developed vestibular apparatus, good eye, good vision with correct color perception, high level of strength endurance and coordination abilities
Gardener. landscaper. Green farm worker. Vegetable grower			
Improvement and gardening of lawns, squares, parks, plant care, cultivation of cultivated plants, vegetables and fruits	The structure of cultivated plants of vegetables and fruits, their types and varieties, conditions for their cultivation and reproduction, rules for planning and designing a garden, procedures for preparing soil for sowing and planting	Prepare the soil, cultivate crops, vegetables and fruits, care for and prevent diseases, work with garden tools, mow lawns, trees, pick up vegetable seeds, care for the crop and harvest it	Visual-figurative thinking, aesthetic taste, developed function of visual perception, high level of strength endurance and coordination abilities
Bricklayer			
Laying and repair of stone structures of buildings, bridges, industrial and hydraulic structures	Properties of mortars, waterproofing materials, masonry systems and joint dressing, methods of laying bricks	Produce and disassemble various types of masonry, repair brick walls and foundations, read construction drawings, make sketches	Developed vestibular apparatus, emotional stability, good hearing and eye, accuracy, high level of strength endurance and coordination abilities

Table 2. *The results of control tests to assess the professional-applied physical fitness of young men with mild intellectual disabilities (n = 174)*

Control test	$\bar{X}$	Standard value
Raising the body from a supine position for 1 min, number of times	29,28±3,15	28–40
Flexion extension of arms in an emphasis lying, number of times	18,92±2,75	23–32
Keeping the trunk at an angle of 45^0 from a prone position, with	56,72±5,11	60–90
Keeping the body at an angle of 45^0 from a supine position, with	36,96±4,64	40–60
Romberg's test, s	11,56±2,73	50 и более
Shuttle run, s	9,28±0,63	8–9
Tempo-rhythmic assessment, points	3,8±0,76	5–7

In doing so, we recommend that you adhere to the following logic of their application:

– When working with the BOSU simulator at the initial stages, pay great attention to the ability to maintain a safe, stable starting position; first apply simple exercises without objects; as you master them, increase the coordination complexity of the exercises and add exercises with objects, and then proceed to performing exercises on an inverted simulator (on its flat base).

– It is recommended to start working with the coordination ladder with varieties of steps, performing them while maintaining a distance of three to four cells; gradually increasing the pace, while achieving a decrease in the number of errors, move on to running steps (the general requirement is not to step on the rungs of the stairs); after mastering them, include turns and exercises without visual coordination (with eyes closed).

Strength-oriented exercises (Super Pump) are recommended to be carried out to musical accompaniment with various equipment (barbell bar, dumbbells, disks) or your own weight; between music tracks it is recommended to arrange a rest lasting 1-2 minutes.

C**onclusions.** The most significant physical qualities for young men with mild intellectual disabilities, which determine the success of their professional activities, include: strength endurance and coordination abilities. The formation of these physical qualities will be facilitated by the methodology of professionally applied physical training, based on the use of exercises with BOSU and Super Pump simulators.

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Features of inclusive physical education of preschool children with general undevelopment of speech

UDC 376.37

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Abstract

Objective of the study was to develop and experimentally prove the effectiveness of the methodology of inclusive physical education of preschool children with general underdevelopment of speech by means of fitness.

Methods and structure of the study. The pedagogical experiment was carried out on the basis of preschool educational institutions in the city of Tchaikovsky. The study involved preschool children of five-six years old with general underdevelopment of speech and their peers with normative speech development attending groups of a combined type. In order to determine the effectiveness of the methodology in preschoolers, changes in indicators of physical development and physical fitness, the level of speech development and communication skills were assessed.

Results and conclusions. The methodology of inclusive physical education of preschoolers with general underdevelopment of speech is based on the complex use of fitness means (classical aerobics, step, fitball and logo aerobics, stretching and yoga), outdoor games, finger gymnastics, breathing exercises and exercises with speech material. Based on the results of the study, the following conclusions were made: the experimental methodology, created taking into account the peculiarities of the psychomotor development of children with general underdevelopment of speech, allows for a comprehensive solution of the problems of inclusive physical education; the implementation of the methodology contributes to the growth of physical fitness and the level of communication skills of preschoolers who participated in the experiment. There is a statistically significant positive dynamics of speech development indicators in children with general speech underdevelopment.

Keywords: *inclusive education, preschoolers, general underdevelopment of speech, fitness.*

Introduction. Recently, there has been an increase in the number of children with general underdevelopment of speech [2, 6]. General underdevelopment of speech is a form of speech anomaly in which the formation of all components of the speech system, related to both the sound and semantic aspects of speech, is impaired, with intact hearing and intelligence. Speech disorders affect the physical and mental development of preschoolers. In children with general underdevelopment of speech, there is a lag in the development of physical qualities, difficulties in the correctness and accuracy of performing motor tasks, memorizing the sequence of movements, performing exercises according to verbal instructions, reproducing a given tempo and rhythm of movements, and underdevelopment of fine motor skills [3, 6]. Peculiarities of psychophysical and speech development of children complicate their social adaptation and require purposeful correction.

At present, an important role in creating conditions for the successful socialization of children with disabilities is played by inclusive education, which involves ensuring equal access to education for all students, taking into account the diversity of special educational needs and individual opportunities [5]. When organizing inclusive education, developmental features and specific educational needs of children with disabilities (HIA) should be taken into account and favorable

conditions should be created for all participants in the educational process. In this regard, it is relevant to search for effective means, methods and forms of organizing physical education in the system of inclusive education of preschoolers with general underdevelopment of speech, which allow solving the problems of strengthening health, increasing physical fitness, overcoming speech disorders, developing communication skills and increasing the level of social adaptation of children with speech impairment in conditions of joint classes with children with age-appropriate speech development [1, 4].

Objective of the study was to develop and experimentally prove the effectiveness of the methodology of inclusive physical education of preschool children with general underdevelopment of speech by means of fitness.

Methods and structure of the study. The pedagogical experiment was carried out on the basis of preschool educational institutions in the city of Tchaikovsky. The study involved preschool children of five or six years old with general underdevelopment of speech (16 people in the control (CG) and experimental (EG) groups) and their peers with normative speech development (44 people in the CG and 22 people in the EG), attending groups combined type. In order to determine the effectiveness of a methodology based on the complex use of fitness means, preschoolers were assessed changes in physical fitness indicators, the level of speech development and communication skills.

Results of the study and their discussion. In the course of the study, a methodology was developed for inclusive physical education of preschoolers with general underdevelopment of speech by means of fitness.

The main objectives of the methodology were: health promotion, improvement of physical development and increase in physical fitness of preschoolers, mastering motor skills, improving speech development, increasing the level of communication skills and social adaptation.

The content of the methodology included means of various types of fitness (classical aerobics, step, fitball and logo aerobics, stretching and yoga), outdoor games using fitness technologies, finger gymnastics, breathing exercises and exercises with pronunciation of syllables, words and phrases.

In table 1 shows the main fitness tools used in the lessons according to the experimental method.

The types of fitness presented in the methodology allow for a complex effect on the body of those involved, contributing to the solution of not only the general tasks of physical education, but also correctional and developmental ones.

Classes according to the experimental methodology were implemented within the framework of the "Children's Fitness" circle, in which children with speech disorders and children with normative speech development were simultaneously engaged. Elements of the methodology were also used in other forms of physical activity of preschool children: in morning gymnastics complexes, sports leisure activities, sports festival, demonstration performances. Classes were held twice a week in the afternoon, the duration of the classes was 25 minutes. During the school year, children consistently mastered different types of fitness.

Preschool children with speech disorders are characterized by a slow process of formation of motor skills, errors occur more often [3]. If there were difficulties in mastering motor actions, the children were given a simplified version of the exercise, a slow-tempo demonstration was used, accompanied by counting and verbal comments.

Table 1. *Fitness means used in the methodology of inclusive physical education of preschool children with general speech underdevelopment*

Kind of fitness	Fitness means
Classic aerobics	Basic steps with hand movements, muscle strength exercises with and without objects, dance games
Step aerobics	Basic steps, exercises for the development of muscle strength on the step, exercises on the step in pairs, outdoor games
Fitball aerobics	Basic steps sitting on the ball, exercises with the ball in hands and on the ball, outdoor games with the ball
Logo aerobics	Basic steps combined with pronunciation of words, recitatives, quatrains
Game stretching	Sets of exercises of a plot-role-playing or thematic orientation ("butterfly", "peacock", "crane", "turtle", etc.), paired stretching
Children's yoga	Postures of «snake», «dog», «tree», «lotus», «stork», etc., chest, diaphragmatic breathing, relaxation exercises

Table 2. *Structure and content of a comprehensive fitness class*

Parts of the lesson	Contents
Preparatory part:	- varieties of walking and running - basic aerobic steps combined with hand movements
Main part:	- classical / step / fitball or logo aerobics exercises - mobile game - exercises with speech material - exercises for developing muscle strength with step / fitball / with objects / with weights - breathing exercises
Final part:	- stretching / yoga exercises - finger gymnastics - relaxation exercises - breathing exercises

The content of the classes was determined by the type of fitness, the stage of training in motor actions and was built according to the principles of accessibility and consistency. When mastering different types of aerobics, children were introduced to the name of exercises (movements), showed and explained the execution technique, used repeated repetition of the elements being learned under the score and musical accompaniment. Gradually complicate the training material, adding hand movements, connecting steps in combination. To increase the interest of preschoolers in performing physical exercises and creating a favorable emotional background, a plot-game form of classes was used.

Each lesson included outdoor games, finger gymnastics, breathing exercises that promote the formation of speech breathing, and exercises with speech material.

In the second half of the year, the classes were of a complex nature, the content of the classes was based on a combination of the means of previously studied types of fitness according to the thematic plan.

The structure and content of a comprehensive lesson are presented in Table 2.

When implementing the methodology in the context of inclusive education, the following organizational and methodological conditions should be observed:

– classes should be built taking into account the principle of complex impact: to positively influence the development of the motor sphere, mental processes and speech of preschoolers,

– it is necessary to promote the creation of a favorable speech environment in the classroom: outdoor games and exercises with speech material should be included, the method of conjugated speech should be used - pronunciation of the names of exercises together with children,

– the process of physical education in groups of combined orientation should be based on an individually differentiated approach: it is important to take into account the peculiarities of the psychomotor development of children with general underdevelopment of speech, apply the most appropriate means of correcting existing disorders, while creating favorable conditions for the full development of healthy children,

– it is recommended to use techniques in the classroom to develop the communication skills of children (performing exercises in pairs, triplets, groups), facilitating their interaction.

Conclusion**s.** The experimental technique, created taking into account the peculiarities of the psychomotor development of children with general underdevelopment of speech, makes it possible to comprehensively solve the problems of inclusive physical education.

The implementation of the methodology contributes to the growth of physical fitness and the level of communication skills of preschoolers who participated in the experiment. There is a statistically significant positive dynamics of speech development indicators in children with general speech underdevelopment.

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Prognostic parameters of hydrodynamic technical and tactical training of paralympic swimmers in the sport of the blind

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Abstract

Objective of the study was to analytical and empirical identification of predictors of special technical and tactical training of highly qualified athletes in Paralympic swimming for the blind.

Methods and structure of the study. The study included a qualitative analysis of materials previously obtained by surface and underwater photo and video recording of the phases of the swimming cycle when Paralympians swim in various styles, sometimes with the use of LED indicators; an expert survey and a thematic analysis of the experience of the leading coaches of highly qualified (Master of Sports of Russia, International Master of Sports of Russia, Honored Master of Sports of Russia) swimmers of the blind sport was carried out.

Results and conclusions. It is shown that Paralympic swimmers are characterized by two groups of predictors – specific and typical, reflecting what needs to be eliminated or compensated for by the coach and athlete in swimming technique. It is argued that deviation predictors are not technical errors in swimmers with visual impairments, but characterize an initially different organization of locomotion. The substantive differences of the predictors and the possibility of their correction in the selection of adequate methods have been established and described.

Keywords: *sports of the blind, Paralympic swimmer, technical and tactical, deviations, predictors, reserves, technique violations, correction.*

Introduction. Deviations of motor actions (water locomotion) in the technique of Paralympic swimmers from the standards for healthy athletes, determined by the complete absence or limitations of visual control, functional, physical, psychological consequences of HIA, determine and reflect the essence of technical and tactical training reserves (TTTR) [2,3]. Such a deviation or "wrong" technical action was until recently considered as a mistake of swimmers in the sport of the blind, although they form their own body scheme, a unique image of the outside world, special spatial orientation skills, etc., which differ from those of healthy athletes.

It is these "mistakes", deviations in movements that determine or set the actual technical and tactical training reserves. We define them as prerequisites-deviations or predictors of the main TTTR of Paralympic swimmers, reflecting the subject of corrective influences, that is, what needs to be eliminated by correction (or compensation) for the coach and athlete while simultaneously developing specific techniques and skills in Paralympic swimming technique.

Objective of the study was to analytical and empirical identification of predictors of special technical and tactical training of highly qualified athletes in Paralympic swimming for the blind.

Methods and structure of the study. The study carried out a qualitative analysis of materials obtained earlier by the method of surface and underwater photography and video recording of the phases of the swimming cycle when Paralympians swim in various styles, sometimes with the use of LED indicators [1]; an expert survey and a thematic analysis of the work experience [3] of the leading coaches of highly qualified swimmers of the blind sport was carried out. In general, 352 videos of swims received during training and competitive events in 2019-2021 were analyzed as part of the planned scientific and methodological

support for athletes of the Paralympic team of the Russian Federation in swimming for the blind. The survey of nine coaches of Paralympic swimmers in the sport of the blind was carried out in the form of an oral semi-structured interview aimed at identifying predictors of the main reserves in swimming technique.

Table 1. *Interrelations of Informative Indicators of Swimming Technique with Specific Predictors of Technical and Tactical Training Reserves of Paralympic Swimmers in the Blind Sports*

Informative indicators of swimming technique	Specific predictors of swimming technique performance in swimmers with visual impairment
Torso angle of attack, degrees	Muscle tension due to fear of collision
Angular range of footwork, degrees	Distorted image of realized movement
Maximum leg bending angle, degrees	
Angle of flexion in the elbow joint in the middle of the stroke, degrees	
Angle of flexion in the elbow joint at the end of the stroke, degrees	
Dynamics of the angle in the elbow joint, degrees	
Cycle time, s	
Time of the working phase of the stroke, s	
Rhythm, %	Fear of collision before turning
Temp, cycle/min	

Table 2. *Typical predictors, their manifestations in the swimming technique of Paralympic swimmers in the sport of the blind and the possibility of correction*

Basic Typical Predictors	Typical predictors as manifestations of swimming technique requiring correction	Possibility of correction. Correction method
1. Muscle spasm (from exercise)	Premature end of the stroke, inefficient grip when the hand enters the water, distorted stroke trajectory	Possible. Massage
2. The trajectory of the movement of the body in «zigzags» along the path	Increasing the distance actually traveled on a course	Possible (conditionally). Swimmer's wiring method; exercises for the sense of water, orientation in space
3. Insufficient strength training	Premature end of the stroke, negative angle of flexion of the elbow, hand, stroke trajectory down	Possible. Strength training
4. Deviation from the effective stroke trajectory	Premature end of the stroke, negative angle of flexion of the elbow, hand, stroke trajectory down	Possible. Swimmer's wiring method; exercises for the sense of water, orientation in space
5. Insufficient level of development of coordination abilities	Premature end of the stroke, the trajectory of the entry of hands into the water is distorted	Possible. Increasing the amount of work on land, adding simulation exercises
6. Low mobility of the joints, torso	Insufficient extension of the arms during the entry of the hands into the water, a decrease in the length of the stroke	Possible. More work on flexibility
7. Fear of colliding with the side of the pool		Possible (conditionally). Practicing turns with a spotter; exercises for the sense of water, orientation in space
8. High angle of attack	Non-streamlined position in the water ("verticalization" of the athlete's body)	Possible. Depending on the reasons: massage (with severe muscle spasm); changing swimming technique
9. Insufficient speed and speed-strength endurance	Inability to maintain the required speed at a distance, inability to achieve the required competitive speed	Possible. Adding training load to improve endurance
10. Asymmetry of movements	Asymmetry of rowing movements	Possible. Swimmer's wiring method; creating an accurate image of the rowing movement; exercises for the sense of water, orientation in space

Results of the study and their discussion. The study identified two groups of predictors-deviations, the most typical for Paralympic swimmers in the sport of the blind - specific and typical.

Specific predictors are prerequisites-deviations that reflect the influence of nosological features and the consequences of visual disease on the informative indicators of the swimming technique of Paralympians in the sport of the blind. Three predictors were identified as specific ones: muscle tension due to the fear of a collision, a distorted image of the movement being realized, and the fear of a collision before performing turns, presented in Table 1 as factors of influence on eight main informative indicators of sports swimming technique. For two informative indicators - the cycle time and the time of the working phase of the stroke - no specific predictors were found in the swimming sport of the blind.

Typical predictors are basic and deviations in the swimming technique, in a certain combination reflecting a set of characteristic features (nosological, morphofunctional, etc.), constant or regularly repeated in Paralympic swimmers of one specific sports and functional class.

In Table 2 shows the most frequently manifested, regardless of the sports-functional class, typical predictors of TTTR in blind swimmers. It is also shown that most of the typical predictors of the reserves of Paralympic swimmers with visual impairments can be corrected completely or conditionally, but for this it is necessary to select means and methods adequate to the actual predictors for the implementation of the reserves formed as a result of these predictors.

In general, for Paralympic swimmers in the sport of the blind, typical predictors were identified for eight sports functional classes (out of nine classes), namely: S11, S12, S13, SB11, SB12, SB13, SM12, SM13.

Conclusion**s.** The significance of the selected groups of model predictors is that it will allow the coach of a Paralympic swimmer to determine what reserves an athlete has to increase the effectiveness of his technical and tactical training in general, to understand which of these reserves should, first of all, try to implement in work with an athlete , in which of the four main styles of swimming this athlete is most likely to be the most successful in wrestling.

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Peculiarities of injuries in syrian athletes aged 15-17

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Abstract

Objective of the study was to identify the features of injuries in Syrian athletes of different sexes at the age of 15-17 years.

Methods and structure of the study. A complex of research methods was used, including the analysis of scientific and methodological literature, interviews with athletes of different sexes, and a questionnaire survey. During mathematical and statistical processing of data, the reliability of differences in the number of injuries between boys and girls aged 15-17 was determined with calculations using the χ^2 criterion. The calculations were aimed at identifying differences between athletes of different sexes separately for each type of injury and then for all types of injuries. Then the causes of injuries were determined using the example of the ankle joint in athletes and their percentage. The empirical part of the study was organized in Syria during the competitions for the Cup of the Republic in athletics.

Results and conclusions. For most types of injuries between Syrian boys and girls aged 15-17 years old involved in athletics, no significant differences were found. An exception is a significant difference between boys and girls in getting tendon ruptures, which was found only in girls: the empirical chi-square value of 5 turned out to be greater than its tabular value (3.84) at a significance level of 0.05. The most common injuries among athletes involved in athletics were muscle cramps, muscle tears and sprains. The main causes of injuries in the example of the ankle joint in Syrian athletes are insufficient warm-up, overtraining, lack of consideration for the individual characteristics of the athlete, insufficient recovery, unsuitability of places for training. The data obtained can be taken into account in the training of young athletes aged 15-17 years.

Keywords: *athletes, injury, ankle joint, differences, training load.*

Introduction. Injuries are one of the problems that not only prevent athletes from achieving high sports results, but sometimes threaten with serious consequences for their health and even life. The rise in sports injuries hinders regular training and competition. In addition, the treatment and rehabilitation of athletes requires large financial costs, in 10% of cases surgical intervention is necessary, after which there is a decrease in mobility in the joints and the functionality of athletes [1, 2].

According to some scientific data [1, 3], a very high percentage of sports injuries is observed in gymnastics and athletics. The probability of injury in young athletes at the age of 15-17 years increases especially when they move to specialization in certain disciplines of athletics, which is associated with a significant increase in the volume, intensity of the training and competitive load. Therefore, the study of the characteristics of injuries in athletes on the example of Syria at the age of 15-17 years is of considerable scientific interest.

Objective of the study was to identify the features of injuries in Syrian athletes of different sexes at the age of 15-17 years.

Methods and structure of the study. A set of methods was applied: literature analysis, interviews with athletes of different sexes, a survey using a specially designed questionnaire [4], determining the percentage ratio between injury rates, identifying significant differences by calculating the criterion in terms of the number of injuries received between boys (n=49) and girls (n=35) involved in athletics. We

examined qualified athletes aged 15-17 who participated in the Syrian Cup in September 2020. Among them were male and female representatives, specializing in running (n=42), jumping (n=19) and throwing (n=23). The study was conducted from 2020 to 2022 by representatives of the College of Physical Education of the University of Hama (Syria), the Faculty of Physical Education of the Belgorod State National Research University, Belgorod (Russia), the Department of Theory and Methods of Teaching Physical Education of the Utemisov West Kazakhstan University, Uralsk (Kazakhstan), Department of Physical Culture and Sports of the North-Western Institute of Management of the Russian Presidential Academy of National Economy and Public Administration, St. Petersburg (Russia).

Results of the study and their discussion. Analysis of the literature showed that athletes have a variety of injuries. According to the literature [1-3], the highest percentage of sports injuries in athletics are sprains (14.7%), muscle tears and fractures, injuries of the ankle joint (up to 34.48%) and lower leg (19%).

As a result of observation and questioning, data were obtained indicating the typology of injuries in Syrian athletes aged 15-17, presented in Table 1.

It was found that the most common types of injuries are muscle cramps with a percentage of 23.28% in men and 17.46% in women, muscle ruptures - 9.52% in men and 11.46% in women, sprains - 9.52% in men and 5.82% in women. The frequency of injuries in boys (53.44%) exceeds that of girls (46.56%). However, at the time of the examination, no tendon ruptures, abrasions, wounds were found in the boys, and five tendon ruptures, one abrasion and three wounds were found in the girls.

The calculated value of the chi-square indicates the absence of statistically significant differences between boys and girls for all injuries. An exception is tendon rupture, which is not found in boys, but occurs five times (2.65%) in girls (Table 1).

This indicator is significantly higher among girls: the empirical value of 5 is greater than the tabular value of 3.84 at a 5 percent significance level. The chi-square value calculated for all types of injuries in general (0.89) indicates the absence of statistically significant differences between boys and girls.

After identifying the typology of injuries in Syrian athletes and comparing them between representatives of different sexes, it became necessary to find out the causes of injuries, the frequency of their occurrence and the percentage of each other. Since many authors state that the ankle joint most often suffers from injuries in athletes [1-3], it was decided to investigate the causes of this injury (Table 2).

According to Table 2, a poorly conducted warm-up is the first cause of injury in athletes (29.1%). The following significant causes of injuries in athletes are overtraining (16.4%), lack of consideration for the individual characteristics of the athlete (11.6%), underrecovery after the previous training (8.5%), poor readiness to perform motor actions (6.9%), unsuitability of places of employment (5.3%). The rest of the reasons are either of lesser importance, or turned out to be irrelevant altogether.

It should be noted that many causes of injuries, one way or another, relate to the problem of insufficiently

Table 1. *Typology of injuries among Syrian athletes aged 15-17*

Injuries	Youths (n = 49)		Girls (n=35)		Total		Chi-square
	Injury frequency	(%)	Injury frequency	(%)	Injury frequency	(%)	
Broken bones	2	1,06	1	0,53	3	1,59	0,33
Tendon rupture	0	0,00	5	2,65	5	2,65	5
Muscle tear	18	9,52	22	11,64	40	21,16	0,4
Ligament tear	10	5,29	5	2,65	15	7,94	1,66
Dislocation of the joints	4	2,12	1	0,53	5	2,65	1,8
Abrasions	0	0,00	1	0,53	1	0,53	1
Bruised bones	1	0,53	4	2,12	5	2,65	1,8
Muscle injury	3	1,59	1	0,53	4	2,12	1
Stretching	18	9,52	11	5,82	29	15,34	1,69
Wounds	0	0,00	3	1,59	3	1,59	3
Muscle cramps	44	23,28	33	17,46	77	40,74	1,57
Other	1	0,53	1	0,53	2	1,06	0
Total	101	53,44	88	46,58	189	100	0,89

Tabulated chi-square value for each type of injury at 0.05 = 3.84.

Table 2. *Causes of ankle injuries in Syrian athletes*

Reason	Quantity	Percentage, %
Insufficient warm-up	55	29,1
Overtraining	31	16,4
Lack of consideration of the individual characteristics of the athlete	22	11,6
Insufficient recovery from previous workout	16	8,5
Poor motor fitness of an athlete	13	6,9
Unsuitability of a place for training or competition	10	5,3
Continuing training with an injury	5	2,6
Use of unsuitable sports equipment	5	2,6
Inadequate behavior of athletes	5	2,6
Failure to comply with safety rules	3	1,6
Bad weather	3	1,6
Lack of control over athlete training	3	1,6
Resuming training before full recovery is complete	3	1,6
Lack of necessary equipment	3	1,6
Violation of the principle of gradual loading	3	1,6
Insufficient rest between exercises	2	1,1
Poor mental preparedness	2	1,1
Athlete's ignorance of his readiness to perform certain exercises	2	1,1
Wrong selection of exercises	1	0,5
Lack of knowledge about sports injuries	1	0,5
Lack of timely medical examinations	1	0,5
Non-compliance with the training program	0	0
Lack of information about the athlete by the coach	0	0
Total	189	100

responsible attitude and preparedness of both athletes and coaches for training and competitive activities, systematic monitoring of the effect of the load on the body and the functional state of the athlete.

Conclusions. The study revealed the most common injuries among Syrian athletes aged 15-17: muscle cramps, muscle tears, sprains.

There were no significant differences in the number and nature of injuries between male and female athletes. However, there are significant differences in tendon rupture, which is absent in boys, but occurs in girls - an empirical chi-square value of 5 was obtained, a tabular value of 3.84 at $p<0.05$.

The causes of ankle joint injuries are: insufficient warm-up (29.1%), overtraining (16.4%), lack of consideration for the individual characteristics of the athlete (11.6%), insufficient recovery after training (8.5%), poor readiness to perform motor actions (6.9%), unsuitability of places of employment (5.3%).

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Methodology for selecting children in groups of initial training in swimming

UDC 796.015.12

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Abstract

Objective of the study was to study the effectiveness of the methodology for selecting children of seven to eight years old in the group of initial swimming training, supplemented by a block of psychological and pedagogical assessment of personal qualities.

Methods and structure of the study. The study involved children aged seven to eight years who wished to go in for swimming, the total composition of the subjects was 16 people. To achieve the goal, the following blocks were studied and evaluated: the physical fitness of young swimmers, psychological and pedagogical assessment, and testing was carried out to identify the level of motivation for swimming (based on the "Ladders of motives" by A.I. Bozhovich, I.K. Markova).

Results and conclusions. It was revealed that the distinctive features of the content of the experimental methodology for selecting children of seven to eight years old in the group of initial training in swimming is the addition of a block of psychological and pedagogical assessment, based on the assessment of personal qualities (type of temperament, psychotype) and characterizing the predisposition and readiness of children for swimming lessons. According to the identified personal qualities, the most promising children of seven to eight years of age, when selected for the group of initial training in swimming, are children with a sanguine or phlegmatic temperament type, and introverts according to their psychotype. Young swimmers who passed the selection according to the experimental method feel the need to personally achieve high results, participate in competitions, while in children of the control group, the motives are mainly based on the recognition and approval of others (parents, comrades, coaches).

Keywords: *swimmers, sports selection, psychological and pedagogical assessment, personal qualities, methodology, physical training.*

Introduction. Currently, sports teachers, when selecting promising swimmers, are guided by the degree of speed of mastering the technique of a sport, the intensity of the growth of sports results, and the levels of development of physical abilities [1, 4].

The erroneous sports orientation of children and adolescents leads to great losses: firstly, the child's psyche is injured, and secondly, it does not allow improving the quality of the training process.

The problem of further increasing the level of sports achievements is reduced not only to the development of new training methods, but also to the search for sports gifted children and their training using the most effective modern methods [2, 5, 6].

Objective of the study was to study the effectiveness of the methodology for selecting children of seven to eight years old in the group of initial swimming training, supplemented by a block of psychological and pedagogical assessment of personal qualities.

Methods and structure of the study. The pedagogical study was conducted on the basis of the Regional state budgetary institution "Sports school of the Olympic reserve for basic and Olympic sports "Start", Chaikovsky (Perm Territory), in which children aged seven to eight years old who wanted to go in for swimming took part, the total composition of the subjects was 16 people. According to the results of the psychological and pedagogical assessment, two groups were

formed - control and experimental, eight people each (five boys and three girls).

The algorithm for dividing children into control and experimental groups was as follows:

– Children were selected according to the test results (indicators of physical fitness) in the initial training group, all of them fulfilled the regulatory requirements for enrollment in accordance with the Federal standard of sports training for the sport "swimming" [3].

– According to the existing selection methodology in sports practice, the following selection criteria were applied: age favorable for starting swimming lessons; the absence of serious deviations in the state of health and a tendency to diseases that prevent sports; compliance of the morphotype with the requirements of swimming; compliance of the level of motor abilities with the requirements of swimming.

– According to the identified personal qualities, the division of children (16 people) occurred according to the following principle: EG (eight people) - children with a sanguine, phlegmatic temperament type, psychotype - introverts; having an assessment of personal qualities (according to the methodology of L.S.

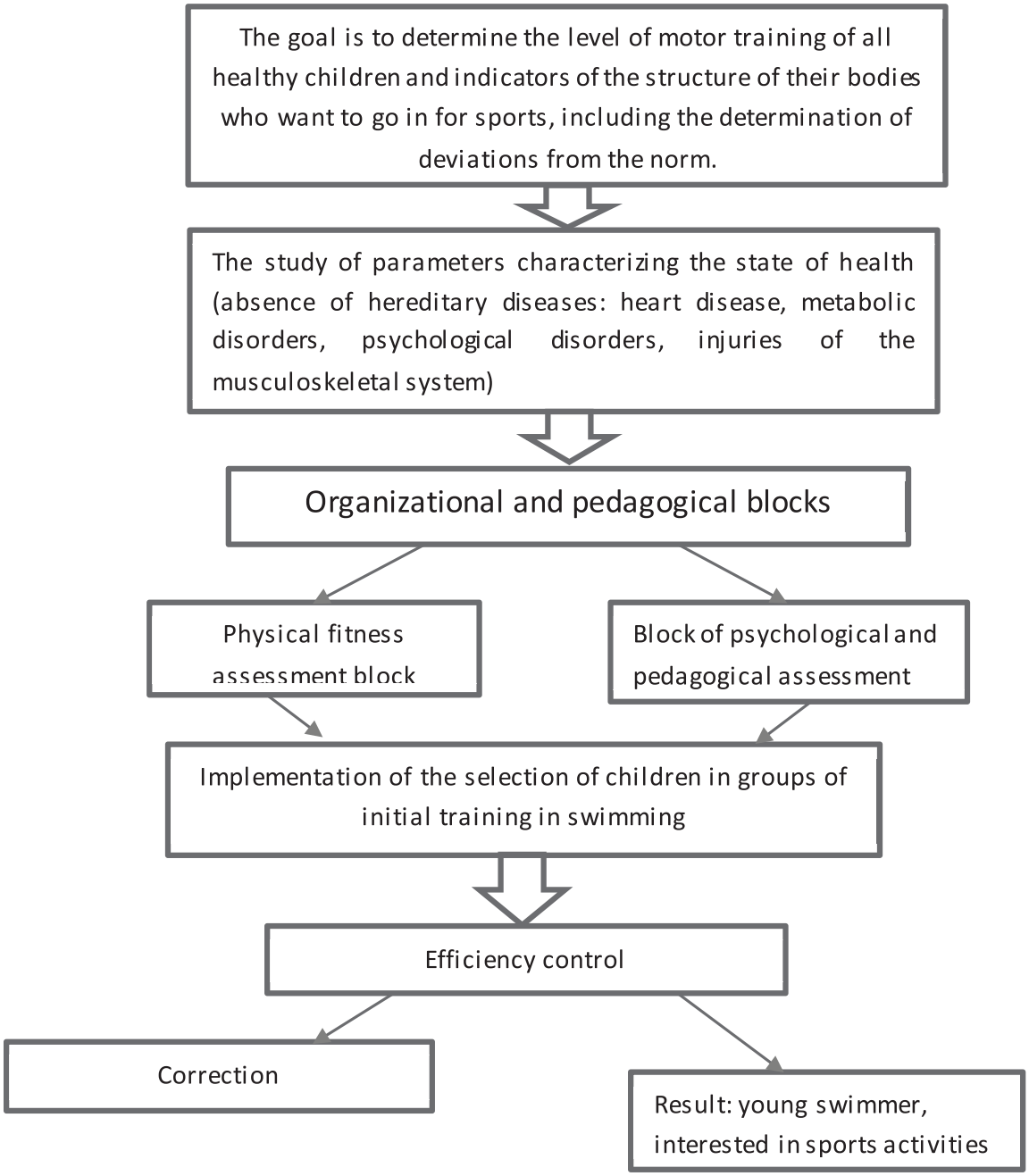

Figure 1. *Algorithm for implementing a methodology aimed at the effective selection of children of seven to eight years old in groups of initial training in swimming*

The principle of preferential distribution according to a comprehensive assessment of the personality into groups (CG, EG) of children of seven to eight years old for the implementation of experimental work

Group type	Number of children, people			Temperament type	Psychotype	The level of assessment of personal qualities
	Total	Boys	Girls			
EG	8	5	3	Sanguine Phlegmatic	Introvert	High Middle
CG	8	5	3	Sanguine Choleric Melancholic	Extrovert	Middle Low

Solntseva, V.V. Medvedev) - high and medium level; CG (eight people) - the rest of the children.

Further, in the process of implementing experimental work, training sessions were conducted in groups of initial training according to the approved plan three times a week for 40 minutes. All subjects were engaged in the general plan of sports training. At the end of our experiment (April 2021), we re-tested physical fitness indicators and studied the issue of motivating children of seven to eight years to go swimming.

Results of the study and their discussion. The figure shows a scheme for implementing a methodology aimed at the effective selection of children of seven to eight years old in groups of initial swimming training. Next, we consider the results of the implementation of this technique.

Physical fitness assessment block. According to the Federal standard of sports training for the sport "swimming", this block includes the development of physical qualities: speed-strength, flexibility. The effectiveness of the implementation of the experimental technique is confirmed by the following results:

– *"Throwing stuffed ball 1 kg"*: in the EG there is an increase in a high level of formation - 12.5% higher than in the CG, also decreased by 12.5% of children from the EG who performed the test at a low level;

– *"Shuttle run 3x10"*: in the EG the number of children who showed the results of a high level of formation of speed-strength abilities increased by 37.5%, and in the CG only by 12.5%;

– *"Twisting of straight arms back and forth"*: in the EG who performed this test at a low level, the results decreased by 37.5% and increased by 50.0%, reflecting a high level, while in the CG the changes were insignificant;

– *"Bending forward from a standing position on an elevated position"*: in the CG and the EG, the number of trainees who completed the test at a low level decreased by 12.5%, and the number of children who completed the test at a high level increased by 25.0% more in the EG, than in CG.

Block of psychological and pedagogical assessment. In typical selection methods for primary training groups, trainers pay attention to assessing such psychological qualities of a child as perseverance, perseverance, endurance, etc. However, many scientists studying the problem of selecting children for sports sections talk about the need to include the child's personal qualities in the assessment. At the initial stage of experimental work, when selecting children for primary training groups, we tested the indicators of physical fitness of seven-eight-year-old children according to the normative indicators presented in the Federal standard of sports training for the sport "swimming" [3].

The results of the study showed the following distribution of children:

– by type of temperament: sanguine - eight people, phlegmatic - two people, choleric and melancholic - three people each;

– by psychotype: introverts - nine people, extroverts - seven people;

– combination of temperament and psychotype, the most preferable for swimmers: phlegmatic-introvert - three people, sanguine-introvert - five people.

Thus, according to the results of the psychological and pedagogical assessment of children, two groups were formed, shown in the table.

It should be noted that there were practically no studied children who fully corresponded to our principles of distribution. Therefore, the priority was determined in the selection - this is temperament and psychotype.

Children who coped with the standards were enrolled in groups of initial training in swimming (16 people). The results of the survey according to the method of Hans Eysenck made it possible to identify the children who are most inclined to swimming according to the type of temperament and psychotype.

At the end of the experimental work, testing was carried out to determine the level of motivation for swimming (based on the "Ladders of motives" by A.I.

Bozhovich, I.K. Markova) among those involved in the control and experimental groups. Based on the test results, it was revealed that the children from the EG "built" the ladder of motives in the following way: 1. Obtaining high results. 2. Participation in sports competitions. 3. Approval of parents, etc. In general, the motives of those involved in CG are based primarily on the recognition and approval of others (parents, friends, coach), and the children of the experimental group feel the need to personally achieve high results, participate in competitions.

It should be noted that by the end of the experimental work in the EG, all the children continued the training process in the group, while in the CG the number of children decreased by 37.5%.

C**onclusions.** The results of the study showed that young swimmers of the initial training group, who were selected according to the experimental methodology, have a motivation for swimming, mainly based on the opportunity to participate in sports competitions and get high results. The effectiveness of the implementation of the experimental methodology is confirmed by positive changes in the manifestation of flexibility and speed-strength abilities of young athletes.

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Digital technologies in the system of humanitarian education in the conditions of a physical university

UDC 796.011.3

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Abstract

Objective of the study was to determine the attitude of students and teachers of a sports university to the digitalization of the educational process in the framework of the study of the humanities and natural sciences.

Methods and structure of the study. To achieve this goal, a survey method was used. 125 students and 15 teachers of the Department of Social-Humanitarian, Pedagogical and Natural Sciences of the Tchaikovsky State Academy of Physical Culture and Sports took part in the survey.

Results and conclusions. As a result of the experiment, the attitude and degree of adaptation of students to various forms of education during the period of quarantine measures was determined. Most of them have successfully adapted to the transition to distance learning. The attitude of students to the use of digital learning technologies in the process of studying the humanities, natural sciences is determined. The prevailing number of students "rather agree" with the use of digital learning technologies, a little more than a quarter of all students surveyed chose the category "rather disagree". Assessing the changes in the quality of education of students during the period of quarantine measures, teachers generally noted its deterioration among students of our university. Teachers consider digital technologies as progressive, allowing to diversify and intensify the educational work of students, but only as an additional tool for educational activities.

Keywords: *digital technologies, humanitarian and natural science disciplines, distance learning.*

Introduction. Today, the process of digitalization has become an integral part of modern higher education. On the one hand, this is the training of highly qualified specialists to work in new sectors of the digital economy, on the other hand, the formulation of clear goals and objectives, as well as their consistent solution in relation to the problems facing the higher education itself, for example, increasing the prestige and competitiveness of education in general, reducing the burden on the subjects of the educational process, increasing the motivation to acquire knowledge and then, accordingly, reducing the proportion of lagging students.

The relevance of the introduction of modern digital technologies in higher education is indicated in the works of domestic researchers in the field of pedagogy of higher education (M.V. Alyushin, V.V. Grinshkun, G.A. Kruchinina, S.K. Pozdnyakova, I.V. Robert, T N. Suvorova, B. E. Starichenko and others) [3].

Objective of the study was to determine the attitude of students and teachers of a sports university to the digitalization of the educational process in the framework of the study of the humanities and natural sciences.

Methods and structure of the study. To achieve this goal, a survey method was used. 125 students took part in the survey: 1st year students (60 people) and 4th year students (65 people), as well as 15 teachers of the Department of Social-Humanitarian, Pedagogical and Natural Sciences of the Tchaikovsky State Academy of Physical Culture and Sports The study was carried out in four stages. At the first stage, the attitude and degree of adaptation of students to various forms of education during the quarantine period was revealed; at the second stage, the attitude of students to the use of digital learning technologies in the process of studying the humanities and natural

sciences was assessed; at the third stage, teachers assessed changes in the quality of education during the period of work in remote mode; at the fourth stage, the attitude of teachers of the humanities and natural sciences to the digitalization of the educational process was determined.

Results of the study and their discussion. The results of a survey aimed at identifying the attitude and degree of adaptation of students to various forms of education during the difficult period of quarantine measures showed the following.

To the question "How do you rate your ability to use a computer and the Internet?", in general, the respondents' answers predominate, indicating a high and good level of skills in using a computer and the Internet. The number of first-year students with a high and good level of computer and Internet skills is greater than 4th-year students by 10.1%.

To the question "What technical problems did you encounter during the period of distance learning?" students answered as follows: 4.8% of fourth-year students had problems with the Internet, 35.7% of fourth-year students and 25% of first-year students noted poor Internet speed, 7.1% of fourth-year students and 50% of first-year students noted the lack of the necessary device freshmen. Approximately the same proportion of both groups of respondents had no problems.

Analyzing the answers of students about the organization of the educational process during the period of quarantine measures, it can be stated that a greater number of fourth-year students (73.1%) adapted to the conditions of transition to distance learning as "good" and "excellent" compared to first-year students (58.3%).

It was determined that a significant part of the students of both the 1st and 4th courses went through the process of adaptation to distance learning well, in our opinion, this is due to the fact that senior students had a similar learning experience in a university environment earlier.

The second stage of the study, as mentioned above, was to determine the attitude of students to the use of digital learning technologies in the process of studying the humanities, natural sciences. To the question "Do you agree, in general, with the use of digital technologies in the process of studying the humanities and natural sciences?" the prevailing number of students (4th year - 37.9%, 1st year - 41.7%) noted that they "rather agree", slightly more than a quarter of all students surveyed (4th year - 29.4%, 1 2nd year student – 25%) stated that they "rather disagree".

Interesting and indicative, in our opinion, were the students' answers to the question "For what purpose do you usually use LMS Moodle (EIOS educational platform) in the process of studying at a university?"

For two positions, the shares of answers to this question almost coincided: "I download educational and reference materials" (4th year - 22.9%, 1st year - 26.7%), "I do practical tasks, including homework » (4th year - 30.3%, 1st year - 33.3%). The priorities for 4th year students when working with LMS Moodle were determined as follows: "I turn to the teacher for help and reference information" - 17.4%, "I study theoretical material in the discipline" - 19.2%. First-year students identified the following answers: "I follow my progress in the grade book" - 20%, "I follow the news and announcements of the course" - 26.7%. But the need and the need to communicate with other participants in the educational process at the forum among the fourth-year students was noted by 0.9% of the respondents, among the first-year students, not a single person chose this option.

Such results are explained by students' doubts about the possibilities of digital technologies when presenting theoretical material in the humanities and natural sciences and performing laboratory and practical tasks, for example, to determine the anthropometric indicators of the body and the parameters of speed-strength fitness using scientific equipment. In addition, studying the attitude of students to the categories of "digitalization" and "digital technologies", we note that they did not quite accurately grasp the difference between these concepts.

In the student environment, the process of digitalization is perceived differently - some strive for interaction, cultural exchange and not only in the classroom, but also for extracurricular personal communication, for them digitalization at the communicative level creates a certain threat, others - in parallel with educational activities, continue to actively participate in carrying out their sports career, being at trainings, training camps or competitions in other cities and countries, for them, obtaining knowledge in a remote format opens up the opportunity for timely and high-quality mastering of educational material in the humanities and natural sciences [2].

Evaluation by teachers of changes in the quality of education during the period of work in remote mode (the third stage of the study) showed that, in general, they were unanimous and stated that the quality of education among students of our university was deteriorating - 70%, the category "improved" was noted by 15%, "remained unchanged" – 10%, 5% found it difficult to answer.

When answering the question "What do you see as the reasons for the change in the quality of education during the period of distance work?" teachers identified positive and negative factors influencing this process. The teachers attributed to the positive factors: increasing the personal level of ICT competencies; the possibility of using a variety of information educational resources, on-line platforms, etc.; increase in the activity of students who perform independent work in a timely and high-quality manner, etc.

Among the negative factors noted: insufficient understanding of the possibilities of digital technologies and educational resources presented on various information platforms for the courses being studied; low awareness of the ways and methods of using digital technologies; difficulties that arise in the formulation of tasks, excluding students from copying information from Internet sources; reduction of non-verbal communication with students to enhance their intellectual and creative activity; difficulties in implementing a student-centered approach and taking into account the psychological and pedagogical characteristics of students; low motivation and activity among students to study the discipline remotely, including at practical and seminar classes organized on Zoom platforms; a sharp increase in labor costs for checking the independent work of students, etc. [4].

At the fourth stage, in order to determine the attitude of teachers of the humanities and natural sciences to the digitalization of the educational process, teachers were asked to list the advantages and disadvantages of introducing digital technologies into the educational process, give examples and, if possible, comment on each of the positions.

Separately, we note that all teachers of the Department of Social and Humanitarian, Pedagogical and Natural Sciences, to a greater or lesser extent, used and continue to use teaching tools: Discord, Zoom, EIOS, instant messengers, social networks. networks, email mail, etc. [5].

After analyzing the information received, we can state: firstly, not all respondents have the same attitude towards those innovations that are associated with the digitalization of education. An opinion is expressed that the degree of use of digital technologies in teaching the humanities and natural sciences largely depends on the organization of their application (rules of use, ease of learning), on the views of the teacher himself on the results of organized in this direction, innovation, etc.

Secondly, when organizing the educational process and developing educational materials using digital technologies, teachers have to take into account both the general psychological and pedagogical features of modern students: instability and short-term attention, low level of concentration, fragmentation of images and, as a result, poorly developed imagination, inability to build logical reasoning, as well as specific features of students of our university: lack of perseverance, superficiality of judgments, low ability for critical thinking, insufficiently developed speech skills, etc., such realities require the teacher to use digital technologies in a balanced way and use them as a supplement to traditional ones.

Conclusions. For the majority of the students surveyed, who do not experience difficulties when using digital technologies, personal communication with all participants in the educational process remains a priority, and teachers consider digital technologies as progressive, allowing to diversify and intensify students' educational work, but only an additional tool for educational activities.

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Prosocial needs and experience of future physical education teachers in the process of professional education at the university

UDC 378.1

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Abstract

Objective of the study was to identify the prosocial needs and experience of future physical education teachers in the process of professional education at the university.

Methods and structure of the study. The experiment was conducted on the basis of the Faculty of Physical Education of the Belgorod State National Research University in 2021 with the participation of 87 students of pedagogical areas of training based on the online survey "Prosocial practices of the future teacher" (E.I. Eroshenkova), the application of the methods "Social norms of prosocial behavior" (I.A. Furmanov, N.V. Kukhtova), “Measuring prosocial tendencies” (G. Carlo and B.A. Randall), questionnaires “Tactics of accumulating social capital” (A.L. Sventsitsky, T.V. Kazantseva).

Results and conclusions. It was established that students in the process of professional education at the university acquired pro-social experience of participation in the practices of patronage, tutoring, volunteering; expanded the “pro-social” network of helping others; increased the degree of pro-social activity in sports, leisure, educational and developmental, health-oriented activities. In the process of studying at a university, when communicating with teachers and students, future teachers of physical culture prefer to use the tactics of "expressing sympathy", "openness", "assistance". The obtained results fix the effectiveness of the pro-social vector of professional education carried out at the university.

Keywords: *future teacher of physical culture, pro-social needs and experience, professional education at the university.*

Introduction. Professional education of future teachers of physical culture, carried out at the university at the present stage of society development, is increasingly acquiring a pro-social character (from Latin pro - acting in the interests of something, someone and socialis - public), which is reflected in the awareness of the need to form students of competencies aimed at the benefit, benefit to society and a particular individual [1]. Such formation is possible when taking into account the needs of the future teachers themselves in pro-social (helping, collaborating, etc.) pedagogical education and studying their subjective experience in mastering the skills of providing pedagogical assistance, support in solving situations of trouble for children and adults; creating conditions for a shared sense of "we" in the humanization of relations; organization of an ethical, "prosperous" vector of pedagogical communication; solidarity, cooperation, development of the educational ecosystem [2].

Having identified prosocial needs and the presence or absence of prosocial experience among students, it can be assumed whether future physical education teachers will use prosocial tactics and behavior strategies in their further pedagogical activity and everyday life. Taking into account the data obtained will allow to correct the process of professional education carried out at the university, to determine the points of growth for further research and professional activities of physical education teachers.

Objective of the study was to identify the prosocial needs and experience of future physical education teachers in the process of professional education at the university.

Methods and structure of the study. The experiment was conducted on the basis of the Faculty of Physical Education of the Belgorod State National Research University in 2021 with the participation of 87 students of pedagogical areas of training based on the online survey "Prosocial practices of the future teacher" (E.I. Eroshenkova), the application of the methods "Social norms of prosocial behavior" (I.A. Furmanov, N.V. Kukhtova), "Measuring prosocial tendencies" (G. Carlo and B.A. Randall), questionnaires "Tactics of accumulating social capital" (A.L. Sventsitsky, T.V. Kazantseva). To obtain and process empirical data, methods of quantitative and qualitative data processing, Google Forms, Microsoft Excel services were used.

Results of the study and their discussion. The data obtained as a result of an online survey revealed that future physical education teachers, to a greater extent, during their studies at a university, feel the need for a diffuse type of pro-social pedagogical assistance (40.3%), which consists in positive interaction, friendly communication, joint pastime, distraction from stressor; emotional type of assistance (37.7%) aimed at personal confidential communication, expression of sympathy, empathy, ensuring interpersonal comfort, support and security. To a lesser extent, students need status assistance (7.8%), expressed in a positive social comparison, support for self-esteem, self-esteem, individuality of the subject, etc.

At the same time, as 22.5% of respondents stated, at the university students fully satisfy their needs for emotional, informational, intellectual, status assistance provided to them by teachers, curators of student groups and other subjects of professional education, but are not completely satisfied with organizational assistance, aimed at assisting in planning and implementing the plan, coordinating the efforts of other entities, etc. 21.7% of respondents rated the instrumental type of assistance (assistance in the management of resources, services, in overcoming the crisis, etc.), and 20.1%. - a diffuse type of assistance, which turned out to be the most in demand, according to future physical education teachers.

As for the study of the subjects of pedagogical assistance at the university, they, according to 74.8% of students, are classmates; 63.6% of students indicated the curator of the student group, and 42.9%. - subject teachers. The future teachers of physical culture themselves note that during their studies at the university they have the experience of participating on an ongoing basis in pro-social practices, including helping other people, practices of patronage, tutoring, volunteering, volunteering, etc. The following results were obtained: " I never participate" – 3.9%; "almost never" – 16.9%; "sometimes" – 41.6%; "I participate sufficiently" – 18.2%; "participate often" – 19.5%. Moreover, in the "pro-social network" of people who are most often assisted by future physical education teachers, they were included in order of importance: friends - 92.2%; relatives - 84.4%; classmates - 50.6%; acquaintances - 39.0%; veterans, old people - 31.2%; neighbors - 20.8%; needy categories of citizens - 18.2%; strangers, random people - 16.9%; countrymen - 10.4%. The option "other" was not specified by the students. In total, the results exceed 100%, since no more than 5 choices could be made.

It was also revealed that students provide the most assistance to: children - 68.8%; old people - 55.8%; women - 54.5%. To a lesser extent - people with disabilities (HIA), the disabled - 40.3%; men - 31.2% and animals - 27.3%.

As the students' answers showed, the university contributes to the formation of their prosocial experience in leisure, sports activities (53.2%), health-oriented (46.8%), as well as in educational and developmental activities (44.2%). To a lesser extent, future teachers of physical culture note that they have experience in social-pedagogical (20.8%) and spiritual (13.9%) activity.

As for the measurement of prosocial tendencies [3], future physical education teachers have more experience of "compliant" (obliging, on the basis of a request) behavior - 32.7% and experience of "emergency prosocial behavior" - 26.9%, when it is necessary to help because the other person needs it. The tendencies of emotional (17.5%), public (13.7%), anonymous (5.7%) and altruistic behavior (3.9%) are used less frequently.

Of scientific interest are the results obtained in the study of social norms of prosocial behavior [3] and the frequency of their application in practice-oriented pedagogical activity at the university. Thus, for future teachers of physical culture, the reference point in the implementation of pro-social activities is the "reciprocity norm" - 36.4%; "norm of fairness" – 28.2%;

the norm "costs - rewards" - 18.1%; “norm of social responsibility” – 17.3%.

During the study of everyday prosocial practice [4], students were asked to determine the frequency of tactics they use in the process of studying at a university. The results of the study showed that tactics aimed “at others” (“expression of sympathy”, “empathy and attention”, “bribery”, “openness”, “unique contact”, “help”) are mentioned by students more often (in 69% of cases) than tactics aimed "at oneself" ("self-presentation", "intelligence", "community", "reminder of oneself", "assistance", "bridge") (in 31% of cases). Tactics of "openness" (50.4%), "assistance" (46.2%), "expression of sympathy" (45.1%) occupy leading positions in terms of the number of elections. The least chosen by the students were tactics: “reminder of oneself” and “bribery”.

Conclusions. The results of the study indicate the formation of prosocial needs in diffuse and emotional types of assistance among future physical education teachers, but the insufficiency of their satisfaction in the process of studying at a university. Students associate the experience of providing and receiving prosocial assistance mainly with classmates, the curator of the student group, leisure and sports activities, which reflects the cohesion of the student team and the effectiveness of professional education at the university.

Despite the predominance of accommodating tendencies in the provision of professionally oriented pedagogical assistance, students are more inclined towards prosocial tactics aimed at “others”. This, in our opinion, is due to the specifics of the pedagogical training received by students at the university. This circumstance confirms the conclusion about the productive work of the university in the professional education of future teachers of physical culture [1] and the formation of students' pro-social needs, attitudes, experience, awareness of the socio-pedagogical significance of "helping", "contributing", aimed at the benefit and benefit of the activity of the future teacher.

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