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Theory & Practice of Physical Culture

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

Assistive technologies in increasing physical activity of students

It is known that physical inactivity of students who engage in sports or various types of physical activity, resulting from injury and, in this regard, lack of physical activity or training, adversely affects the regeneration processes of damaged tissues of the musculoskeletal system and functional systems. As a result of a long absence of training sessions, performance, motor skills and quality of life decrease. Therefore, it is extremely important to mobilize the injured student early.

To ensure that students can freely attend classes, a variety of digital assistive technologies are used, which provide the opportunity to restore motor activity after suffering injuries without interrupting their educational activities.

It is generally accepted that assistive technologies (AT) are an integrative concept that characterizes means, tools, services and devices, the use of which allows one to expand a person's ability to adapt to various living conditions, regardless of his or her health status,

AT, as a rule, can be presented in the form of software, electronic, mechanical, optical design, and used depending on the level of functional state.

For example, students with motor impairments can use online simulators, computer programs, and mobile applications designed to train vision, coordination movements, and cognitive abilities.

A technology aimed at improving motor skills is virtual reality, which is a computer simulation of a real environment and provides the injured student with a sense of presence using 3D images and animation, and also allows you to interact with various objects in this environment. Virtual reality helps students repeat movements and practice.

In recent years, due to their relatively low cost, there has been an increase in the use of wearable devices and fitness applications designed to measure kinematic and kinetic parameters of movement, which are assessed using inertial sensors, other characteristics of movement in space are measured using pedometers, GPS and other location data recorders. Combine gadgets and mobile apps with training programs such as Workout Trainer and adidas Training. Seven, Stark Fitness allows students to exercise and control the load independently.

Video analysis programs allow you to track the trajectory of the student's movement and time. For example, programs such as Kinovea, Darfish, CoachNow allow users to mark the direction of movement, measure the angle of inclination of various objects, exchange information, receive instant feedback, draw and highlight useful information or points.

An interesting solution for conducting classes is the use of motion capture applications based on artificial intelligence, with which you can create animations of motor actions from videos without the need to use specialized equipment or costumes (Movmi, Plask). It offers innovative features such as creating 3D poses from descriptive text and an AI-powered chatbot mentor.

In the modern world, scientific and technological progress contributes to the creation of a complex of technical devices, software applications, online resources, including highly effective, intelligent systems that allow not only to diagnose, rehabilitate, improve, and restore lost physical abilities, but also to become developers of physical activity technologies themselves. .

The main result of physical rehabilitation of the use of modern technologies in adaptive physical culture is the disclosure of the student's life opportunities, personal success, the formation and acceptance of physical culture values.

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

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Theory and Practice of Physical Culture

Contents

Individual monitoring of aerobic and anaerobic performance of hockey players during the annual training cycle

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Abstract

Objective of the study was to increase functional readiness based on individual assessment of aerobic and anaerobic performance of hockey players throughout the annual training cycle.

Methods and structure of the study. Changes in the functional readiness of 15 hockey players of the university student hockey team at the age of 19.5±0.5 years were determined through aerobic and anaerobic testing to assess and correct the direction of the training process in certain periods of the annual training cycle.

Results and conclusions. The aerobic power of the players was stable and maintained at a high level throughout the entire macrocycle. Improvement in the aerobic performance of players during the competitive period was reflected in an increase in the level of VO_2 max to 55-60 ml/min/kg. A decrease in the parameters of anaerobic performance of the subjects was revealed.

Keywords: *hockey players, aerobic and anaerobic performance, oxidative-metabolic capabilities, training macrocycle.*

Introduction. The need to increase the efficiency of adaptation processes over many years of training in elite sports requires a systematic individual approach. A meta-analysis of performance in hockey confirmed the feasibility of training effects in both aerobic and anaerobic training regimes [7].

Physiological profiles of highly qualified hockey players convey the priorities for the development of general and strength endurance, anaerobic power, flexibility and skating speed. Muscle performance in hockey is 70% provided by anaerobic bioenergy systems and 30% depends on the athlete's aerobic performance [3]. To a certain extent, the operation of the anaerobic energy supply system may depend on the level of oxidative capabilities of the hockey players' body [4, 8].

Achieving an optimal level of performance is ensured by obtaining information about current structural changes in sports form and making appropriate adjustments to the content of the training process of hockey players. Determining the individual adaptation effect caused by different types of training stimuli is crucial for the effective training of players and the team as a whole [1, 6].

Effective formation of conditioning readiness requires optimal regulation of the training load, ensuring the effectiveness of individual adaptation processes in the corresponding bioenergetic zones [2, 5].

Objective of the study was to increase functional readiness based on individual assessment of aerobic and anaerobic performance of hockey players throughout the annual training cycle.

Methods and structure of the study. The sample of the experiment consisted of 15 hockey players from the university student hockey team at the age of 19.5±0.5 years. Changes in functional fitness were de-

termined through aerobic and anaerobic testing to assess and correct the direction of the training process in certain periods of the annual training cycle. Functional performance was measured in the preparatory period, three times during the competitive preparation phase and in the transition period.

Aerobic performance was assessed using a spiroergometric test performed on a bicycle ergometer and a shuttle running test at n 20 m. The internal response of the body to physical activity was expressed in maximum oxygen consumption (VO2max), which characterizes the oxidative-metabolic capabilities of the body and the power of the circulatory system.

To determine the value of maximum oxygen consumption (VO2max), a step-by-step spiroergometric test was carried out to the maximum. The initial load was 1.5 W per kg of body weight. The load increased by 20 W every minute. The test was performed until volitional fatigue or until the respiratory coefficient reached 1.05.

Aerobic performance was also assessed using a shuttle run test for n × 20 m. The intensity of running increased after the first minute. The starting speed of 8 km/h increased by 0.5 km/h every minute. The measured parameters were distance traveled (m) and VO_2 max (ml/kg/min).

Anaerobic performance was measured using a 30-second ergonometric anaerobic test performed on a bicycle ergometer. The test was carried out to anaerobic fatigue with a constant resistance of 7.5% of the subject's body weight. The measured parameters were peak anaerobic power (W/kg), average anaerobic power (W/kg) and anaerobic fatigue index (%).

Results of the study and discussion. The goal of physical training in hockey is to develop speed and strength qualities, achieve a high level of anaerobic and aerobic performance, and increase the ability to neutralize lactate in working muscles. Taking into account the nature of hockey games, it is advisable to gradually change the ratio of aerobic and anaerobic load.

It was found that anaerobic power increased during individual phases of the macrocycle, with the exception of the end of the season. The level of anaerobic performance, expressed by the maximum and average values of anaerobic power, progressively increased throughout the entire macrocycle, with the exception of the end of the competitive period, during which the parameter values decreased.

Training during the transition period was aimed at developing general and speed endurance and strength; Special training on ice was not included in the content of the training sessions.

Improvement in the aerobic performance of players during the competitive period was reflected in an increase in the level of VO2max to 55-60 ml/min/kg. The results are consistent with other studies reporting VO2max values of 50-70 ml/min/kg. A higher level of aerobic performance corresponded to a fatigue index, which in the middle of the competitive period exceeded the data of the initial testing (see table).

The results of the load testing revealed a player fatigue index of 30.2%, which, according to the developed standards, can be considered the optimal value. The results of anaerobic testing at the end of the competitive period indicated a decrease in the measured parameters. The direction of the body's adaptation processes is determined by the content of pre-competition preparation.

When assessing the power of anaerobic energy supply processes, a decrease in the parameters of anaerobic productivity of the subjects was revealed. The sample averages turned out to be lower than the values of anaerobic fitness found in hockey players during the transition and preparatory training period.

Indicators of functional readiness of hockey players

Indicator	Period of the annual macrocycle					
	GPT	SPT	CP_1	CP_2	CP_3	TP
P_{max}, W/kg	9,1±3,2	9,6±0,9	11,8±3,2	11,1±0,7	10,9±0,6	9,3±0,8
P_{avg}, W/kg	8,2±2,5	8,7±3,1	9,3±2,7	9,6±0,4	8,2±1,4	9,0±1,6
Fatigue index, %	28,7±3,0	26,8±2,9	39,5±4,6	30,2±3,7	41,4±5,3	27,5±5,4
Multi-stage fitness test, m×10m³	2,1±0,7	2,2±0,5	2,7±0,1	2,8±0,2	2,5±0,3	2,3±0,3
VO_2max, ml/kg/min	48,4±6,9	41,7±6,2	59,7±9,6	61,6±8,3	62,7±8,6	44,3±8,7

Note: P_{max} – peak power; P_{avg} – average power; GPT – period of general physical training; SPT – period of special physical training; CP_1 – competitive period (beginning); CP_2 – competitive period (middle); CP_3 – competitive period (end); TP – transition period.

The highest values of aerobic power of hockey players were recorded during the competitive period. The aerobic power of the players was stable and maintained at a high level throughout the entire macrocycle. Probably, the achieved result is associated with the high level of endurance of the hockey players, maintained at certain stages of the annual training cycle.

It can be assumed that the positive adaptation of aerobic energy supply mechanisms is caused by the corresponding orientation of the training process. This was reflected in an increase in the level of oxidative processes compared to the off-season preparation stage. At the end of the competitive period, the level of aerobic performance of hockey players increased, and anaerobic performance decreased. The decrease in players' anaerobic fitness can be explained by the lower intensity of games and training compared to previous stages.

Conclusions. When assessing the level of energy supply of players, it is necessary to take into account the individual characteristics of each player. Despite the identical training content, each player adapts to the exercises individually. During the annual cycle, individual monitoring of the functional state of players is significant for identifying adaptation features and making appropriate adjustments to the content and direction of the training process.

Varying the ratio of aerobic and anaerobic load based on test results increases the efficiency of training hockey players during the annual training cycle.

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Operational effects of plyometric training in the development of explosive strength of mountain run athletes

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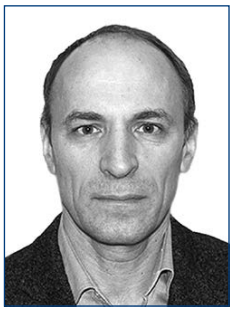

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Abstract

Objective of the study was to increase the efficiency of training mountain running athletes to overcome steep climbs using plyometric training.

Methods and structure of the study. The parameters of the training activity of qualified mountain running athletes aged 23.5±0.5 years were studied. The two-month training period included four two-week microcycles in which athletes performed 10 different exercises aimed at developing explosive strength in the lower extremities.

Results and conclusions. A positive effect of the plyometric training method in increasing speed-strength readiness in mountain running was revealed. The mobilization stimuli of plyometric exercises, aimed at preparing for running on steeply ascending distances, determine the effectiveness of the implementation of speed-strength functionality in mountain running athletes.

Keywords: *mountain running, plyometric training, speed-strength capabilities, explosive strength.*

Introduction. Competitive exercises in mountain running are characterized by exceptional specificity of conditions and the construction of a tactical pattern for passing the route. First of all, this is associated with variations in the nature of the relief, changes in height and steepness of ascents and descents, which causes an uneven rhythm, running tempo, the need to correct movement technique, and an appropriate energy regime to ensure muscle work [2, 8]. Hence, the main special quality of mountain running athletes can be defined as special endurance for performing speed-strength muscle work both during ascents and when overcoming descents of the competitive route [5]. In other words, a runner has to repeatedly repeat work that is similar in energy characteristics of muscular activity to the work of a sprinter, requiring the manifestation of explosive strength in the leg muscles [3, 7].

Due to the exceptional specificity of the requirements of competitive activity, the training process of alpine athletes cannot be built solely on long-term distance loads of uniform running on the plain. In addition, tactical options for completing a competitive distance, based on gaining an advantage over rivals when overcoming steep climbs, have shown their effectiveness [4].

Extreme speed-strength loads when performing high-intensity running actions uphill are present in all categories of distance classification. About 75% of speed-strength activities involve short climbs of up to 50 m in length and a lift height of 15-25%. Serial step ascent of the route can be up to 15% of the competition distance.

For the reasons stated above, the development of explosive power in the leg muscles, which ensures the effective passage of steeply ascending sections of the distance, should become a systematic segment of the training process for mountain running runners.

The plyometric training method, also known as the

"shock method," has been proven by many studies to be a fairly effective means of developing explosive muscle strength [1, 6, 9].

Objective of the study was to increase the efficiency of training mountain running athletes to overcome steep climbs using plyometric training.

Methods and structure of the study. As part of the experiment, screening of the parameters of training and competitive activity of 15 qualified mountain running athletes aged 23.5±0.5 years with basic training in the classical running disciplines of athletics was carried out.

Athletes were trained to overcome short-term, steeply ascending segments of a competitive distance under trail running conditions. The consolidated application of training loads was based on accentuated running uphill with an intense climb for 20 s, which approximately corresponded to the average partial climb during one climb of the competitive route. The magnitude of the load increased due to the inversion of the running technique on the rise into a running jumping step while maintaining the speed of distance running.

In the preparatory part, before the distance training, the experimental group performed a 20-minute set of special plyometric exercises. The two-month training period included four two-week microcycles in which athletes performed 10 different exercises aimed at developing explosive power in the lower extremities: jumping rope, pogo jumps, long and high jumps, single-leg jumping rope, split squats with jumps high jump, jump over a 20 cm high barrier, side jump, side jump over a 20 cm high barrier, long jump on one leg, high jump on one leg, forward jump, jump on a 40 cm high support, depth jump 50 cm, deep jumps followed by jumping to a height of 40, 50 cm. The series of repetitions of each exercise consisted of three sets of eight repetitions, or three sets of 30 reps. The break between approaches was 1 minute.

Athletes in the control group performed special running exercises for 20 minutes.

SPSS version 12.0 was used to calculate the data; results were expressed as means and standard deviations for all variables. Statistical analysis was performed using analysis of covariance (ANCOVA).

Results of the study and discussion. The runners of the experimental group in the peak intensity zone gained from 1.6 to 2.2 km per microcycle, which determined their significant advantage over the athletes of the control group in speed-strength capabilities of a special nature in tests for explosive loading of the leg muscles (see table).

Considering the fact that the positive effect was achieved over a short period of training, it can be argued that even a slight improvement in performance will provide a greater advantage in mountain running.

Based on the test results, it can be stated that there is an increase in muscle and functional adaptation to speed-strength loads of a serial nature. Thanks to the modulation of the plyometric load by the number of repetitions, the variety of means used, the amplitude and direction of movements, a high intensity of deployment of the adaptive response to the use of jumping plyometric exercises is achieved. This was reflected in a significant increase in the speed of mountain running on short sections of the route with a high slope.

In the experimental group, significant differences were revealed when performing a test for step running with poles 3x50 m in a 20% lift before and after the implementation of the training program, which had a significant impact on the development of both the vertical and horizontal power components of jumps. When comparing the initial and final results of the tests of smooth running and step running with sticks, it was found that greater improvement in results occurred in the serial repetition of difficult sections of mountain running using trail running sticks. Presumably, this phenomenon can be explained by the specifics of the training effect, which consists in the use of exercises primarily aimed at improving the vertical component of jumps, which is more in demand in mountain running.

In the step run with poles 3x50 m with a 20% lift, which also requires agility, the athletes revealed significant differences between the experimental and con-

Technical and functional indicators of mountain running readiness of athletes at the end of the training program

Indicator	EG	CG	t	p
50m run up 20%, s	7,1±0,3	8,3±0,4	2,4	< 0,05
Stepped run with poles 3×50 m, up 20%, s	31,4±0,5	32,4±0,6	2,7	< 0,05
Explosive 20m run up 30%, s	6,7±0,3	7,4±0,5	3,7	< 0,05

trol groups. It can be concluded that when developing the agility of mountain running athletes, the eccentric-concentric mechanism of muscle activation is similar to the plyometric training regime.

The results of the short mountain sprint test (20 m at 30% incline) show a significant difference between the groups. It has been established that training effects based on the use of explosive jumping exercises have a positive effect on reducing the time of transition from uniform to maximum speed of mountain running. In the control group, which performed only special running exercises, it was not possible to improve the running time in a short climb with an ascent of 30%.

The results showed that the plyometric group significantly reduced the time of active support on the ground while improving the speed capabilities of athletes in uphill running.

Conclusions. Modern competitive conditions in mountain running place extremely high demands on the level of physical and tactical preparedness of athletes. Quick and sudden changes in terrain, steepness of ascents and descents, sprinting uphill are elements that are present in every competitive distance and are united by a common feature that requires the manifestation of a high level of development of explosive power.

The study confirmed the positive effect of the plyometric training method in controlling amplitude modulations of adaptive reactions of mountain running athletes to concentrated speed-strength loads during an eight-week training period. Mobilization resonators of plyometric exercises, maximally polarized to prepare for overcoming ascents and descents, determine the effectiveness of the implementation of speed-strength functionality in mountain run athletes.

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Control of speed-strength load in training of skiers-racers based on the application of tools

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Abstract

Objective of the study was to experimentally substantiate the use of feedback tools in the operational control of speed-strength loads in the training of highly qualified ski racers.

Methods and structure of the study. The experiment involved ski racers (n=4; MS; 24.5±3.8 years). During 15 training sessions, athletes performed interval exercises using a ski ergometer with regulation of the intensity of physical activity and monitoring of the bioelectric activity of the triceps brachii and latissimus dorsi muscles. The duration of the approaches was 30 seconds with rest pauses of 180 seconds. The intensity of the load was set within 80-85% of the maximum power shown in the test exercise on the ski ergometer. The number of approaches was determined based on muscle contractility. To assess the effectiveness of training, athletes were asked to undergo two tests with a stepwise increasing load on a roller ski treadmill. The test result was assessed by the number of load stages performed, the frequency of movements, the impulse of the driving force of pushing off with ski poles and the reactivity coefficient of the driving force.

Results and conclusions. The performance of athletes increased due to greater manifestation of speed-strength abilities, as indicated by an increase in impulse indicators and the reactivity coefficient of the driving force.

The proposed method of managing the training load using tools can be considered as recommendations for increasing the efficiency of the training process of highly qualified cross-country skiers. The basis of the load management technique using a ski ergometer is: the number of approaches is no more than 10; rest between sets 180 seconds; stopping criterion is a decrease in the power and magnitude of muscle bioelectric activity by more than 10% within 15 seconds.

Keywords: *cross-country skiing, speed-strength abilities, ski ergometer, electromyography, intensity control.*

Introduction. In cross-country skiing, successful performances are largely determined by the level of development of athletes' speed-strength abilities: the realization of power potential in short movements [7]. The effectiveness of speed-strength training depends on metabolic changes in the body, primarily achieved through pronounced degradation of creatine phosphate in the involved muscles and global activation of glycolysis [1, 5]. In this case, excessive accumulation of glycolytic metabolites inside the muscle fiber can lead to a significant decrease in contractility and further performance of the training task will be ineffective [8, 10]. Therefore, managing a speed-strength load is a complex task, since both conditions must be met: the load must lead to the degradation of creatine phosphate, but excessive accumulation of glycolytic metabolites in the active muscle must not be allowed. This task can be solved using simulators with feedback and control over the contractility of active muscles, performed using surface electromyography [4].

It has been suggested that controlling the load of cross-country skiers using tools based on control of muscle activity allows one to adequately and proportionately differentiate the main parameters of the load.

Objective of the study was to experimentally substantiate the use of feedback tools in the operational control of speed-strength loads in the training of highly qualified ski racers.

Methods and structure of the study. The experiment involved cross-country skiers who consistently took prizes in the cross-country skiing championships of the Republic of Belarus in the 2020-2022 seasons (n=4; 24.5±3.8 years). The research program consisted of three stages. At the first stage, initial testing of athletes was carried out in order to assess speed-strength abilities and the nature of their manifestation in the structure of ski locomotion. The second stage consisted of performing a block of training sessions, some of which contained exercises aimed at developing speed-strength abilities, performed in a ski ergometer with feedback and operational control of the bioelectrical activity of the muscles. At the third stage, repeated testing was carried out.

Testing procedure. Testing of athletes was carried out on a roller ski treadmill (POMA, Maschinen- und Anlagenbau GmbH; Germany) and consisted of performing a test with a stepwise increasing load until failure, during which the athletes moved on roller skis with a simultaneous stepless move. The initial angle of inclination of the treadmill track was 5°, and the speed of the belt was 3.0 m/s. Then the track speed increased every 15 seconds in increments of 0.25 m/s. During testing, the biomechanical parameters of the athletes' movement techniques were recorded using an information-measuring system of our own design in the form of KV+ TORNADO ski poles (KV+ SA, Switzerland), equipped with wireless strain gauge sensors, and Qualysis video motion capture cameras (Qualisys AB, Sweden). The assessment was carried out according to the following parameters:

- *movement frequency* (*f*, cycles/min*);*

- *impulse of the driving force of repulsion with ski poles (p,* N*s*),* defined as (1):

$$p=\int F_{mov}*dt, \quad (1)$$

where Fmov is the driving component of the force applied by the athlete to the ski pole (N); dt – time of action of the driving force component (s). Values were calculated in each cycle for the left and right limbs separately and then summed to obtain a total value for the cycle;

- *driving force reactivity coefficient (RC,* N/s*kg), calculated using the following formula (2) [8]:

$$RC = \frac{Fmove\_max}{T_{move\_max} * m_c}, \quad (2)$$

where Fmove_max is the maximum value of the driving force of repulsion with a ski pole, recorded in one cycle (N); Tmove_max – time to achieve the maximum driving force of repulsion from the moment of contact of the ski pole with the support (s); mc – mass of the "athlete-equipment" system (kg). The final indicator for the cycle was determined as the average value between the indicators of the right and left limbs.

The calculation of the driving force component (Fmov, N) was carried out taking into account the angle of inclination of the ski poles relative to the horizontal plane and the inclination angle of the treadmill according to formula (3):

$$F_{move} = \sqrt{((F * \sin a) * \sin \varphi)^2 + ((F * \cos a) * \cos \varphi)^2}, \quad (3)$$

where F is the force applied by the athlete to the ski pole (N); α – angle of inclination of ski poles relative to the horizontal plane (degrees); φ – angle of inclination of the treadmill track (degrees).

Training program. During the 15-week preparatory period (from early May to mid-August), athletes performed 1 workout per week using a SkiErg ski ergometer (Concept2 Inc., USA). A special feature of this device is the presence of a monitor that displays in real time the values of a number of parameters for performing an exercise, which allows it to be used as a means of feedback and operational control over the actions of an athlete.

Training on an ergometer was carried out using the interval method with regulation and control of the intensity of physical activity, expressed in the power developed by the athlete and the frequency of movements. The frequency of movements was set in the most optimal range for simultaneous stepless movement – 60±5 cycles per minute [9]. The target range of movement power was set in the range of 80-85% of the maximum power recorded in the test exercise, which was performed on the 1st, 5th and 10th training sessions using an ergometer. This test consisted of performing a short exercise (10–15 s), during which the athlete first needs to smoothly "spin" the ergometer and then try to develop maximum power [2]. Also, when performing exercises, the athletes were given the task of focusing their efforts on the second half of the active phase of movement, since it is in this interval while moving on skis that the best conditions are created for converting the applied force on ski poles into driving force, and visualization of the force-time curve of the active phase of movement on the ergometer monitor allowed athletes to independently control their actions.

During the exercises, the contractility of the triceps brachii and latissimus dorsi muscles was operatively monitored according to bioelectrical activity data using a Trigno multichannel wireless electromyograph (Delsys Inc., USA). The real-time electromyogram signal was compared to a preset target value of 80-85%

of the maximum recorded during the ski ergometer test exercise described above.

The duration of the exercises was 30 seconds with rest pauses of 180 seconds between each approach. The number of approaches was determined based on monitoring the parameters of movement power and bioelectrical activity of muscles. During one training session, athletes were asked to perform up to 10 approaches, however, if within 15 seconds the athlete could not maintain the target power of movements, and the amount of muscle bioelectrical activity decreased by more than 10%, the task was stopped and the remaining approaches were not performed.

Results of the study and discussion. During the initial testing, the speed of 4.75 m/s was the last step fully completed by all athletes. The average frequency of movement cycles consistently increased from 45.13 ± 2.51 to 69.30 ± 1.86 cycles per minute in the first and last stages, respectively. The maximum values of the impulse of the repulsive driving force were observed at steps with a speed of 4.00-4.25 m/s and amounted to 234.64±27.37 N*s and 234.53±25.50 N*s, respectively. Further, with an increase in speed to maximum, the force impulse values decreased to 203.66±17.03 N*s. The dynamics of the reactivity coefficient indicators were similar: the maximum values were recorded when moving at a speed of 4.00-4.25 m/s (33.69±5.76 N/s*kg and 35.14±4.53 N/s*kg) with a further decrease in values (26.67±4.31 N/s*kg at the last stage) (Table 1). Such dynamics of indicators with an increase in speed from submaximal to maximum probably indicated the inability of athletes to demonstrate strength when performing movements with high frequency, which, at the same time, is of paramount importance for high speed skiing.

During repeated testing, an increase in the athletes' performance was recorded: the step with a movement speed of 5.00 m/s was the last one fully completed for all subjects. The frequency of movements with increasing speed increased from 40.27±3.47 to 72.75±3.74 cycles per minute at the first and last stages. The values of the driving force impulse and the reactivity coefficient consistently increased with increasing speed up to 4.25 m/s, and then a kind of "plateau" was observed - stabilization of the values at approximately the same level with a slight decrease at the last stage (Table 2). The resulting dynamics of the indicators reflected, in comparison with the initial testing, changes in the mechanisms by which athletes increased their speed of movement: an increase in speed to a submaximal level (4.25 m/s step) was achieved by increasing the frequency of movements and power characteristics of repulsion, and a further increase in speed to maximum (step 5.00 m/s) was performed by increasing the frequency while maintaining the achieved level of manifestation of strength qualities. This strategy for increasing speed is considered the most optimal for highly skilled ski racers [6]. In addition, performing more powerful and "explosive" push-offs allowed athletes to move with a lower frequency of movements than in the initial testing, which is also a significant performance characteristic [3].

Thus, high-intensity interval training on a ski ergometer with feedback and operational control of muscle contractility can presumably contribute to the development of speed-strength qualities and increase the performance of highly qualified cross-country skiers. The positive effect achieved was generally expected, given previously published studies that showed that high-intensity training on ski ergometers leads to an increase in power and improvement in the mecha-

Table 1. Results of primary testing (data for the last 4 stages are indicated)

Athlete	Parameters	Movement speed, m/s			
		4,0	4,25	4,5	4,75
V-v	*f, cycles/min*	0,84	0,88	0,94	1,16
	p, N*s	224,2	214,24	203,75	180,96
	RC, N/s*kg	30,31	33,7	28,43	26,94
Sh-v	*f, cycles/min*	0,91	1,01	1,08	1,17
	p, N*s	260,38	268,6	264,5	222,02
	RC, N/s*kg	32,08	30,75	28,71	27,09
B-v	*f, cycles/min*	0,99	1,09	1,2	1,18
	p, N*s	200,98	215,74	208,88	203,81
	RC, N/s*kg	30,14	34,62	29,87	21,07
K-v	*f, cycles/min*	0,86	0,87	1,09	1,11
	p, N*s	253,17	239,54	228,76	207,86
	RC, N/s*kg	42,23	41,47	34,39	31,59

Table 2. Results of repeated testing (data for the last 5 steps are indicated)

Athlete	Parameters	Movement speed, m/s				
		4,0	4,25	4,5	4,75	5,00
V-v	*f, cycles/min*	0,82	0,87	0,89	1,09	1,13
	p, N*s	326,22	317,2	336,14	329,44	326,44
	RC, N/s*kg	62,61	76,06	92,14	101,56	91,72
Sh-v	*f, cycles/min*	0,87	0,97	1,02	1,16	1,28
	p, H*c	232,88	273,08	268,5	263,56	216,72
	RC, N/s*kg	44,95	59,16	56,04	56	49,04
B-v	*f, cycles/min*	0,85	0,93	0,99	1,14	1,21
	p, N*s	269,45	304,16	287,46	298,15	307,76
	RC, N/s*kg	62,96	69,72	71,35	67,95	51,50
K-v	*f, cycles/min*	0,85	0,95	1,05	1,16	1,23
	p, N*s	245,38	298,94	285,61	322,73	274,64
	RC, N/s*kg	48,46	60,74	73,81	79,03	71,87

nisms of anaerobic energy supply to muscle work. At the same time, operational control over the bioelectrical activity of muscles helps the coach to objectively judge the results of the athlete's activity and creates conditions for more effective management of the intensity and volume of the training load.

Conclusions. This study showed that racing skiers performing high-intensity interval training on a ski ergometer contributes to the growth of sports performance by improving speed and strength qualities. At the same time, the use of tools that provide feedback on the parameters of the exercise and operational control over muscle contractility helps to increase the effectiveness of training. Further research is needed to assess the sustainability of the achieved effects over a longer period and to study the potential impact of this type of training on the performance of athletes during the competitive period, involving a larger sample of subjects.

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Correction of movement patterns of skaters through feedback on the distribution of plant pressure in speed running

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Abstract

Objective of the study was to identify the possibilities of correcting movement patterns of speed skaters using feedback on the distribution of plantar pressure in speed running.

Methods and structure of the study. The pilot experiment involved an athlete with many years of experience in international speed skating competitions. To record the distribution of plantar pressure during push-off in skating locomotion, the F-scan system (Tekscan, USA) was used. Based on the results of the first testing, the athlete focused on improving his technical readiness for six weeks. During repeated testing, changes were observed in the characteristics of the implementation of efforts during take-off in high-speed running on ice.

Results and conclusions. The use of feedback techniques in the training process of qualified speed skaters based on plantar pressure distribution indicators helps to improve the individual model of take-off technique in high-speed running on ice, both in a straight line and along a turn.

Keywords: *repulsion, technical readiness, dynamic characteristics.*

Introduction. To cover a competitive distance in the shortest possible period of time, speed skaters must be able to optimally distribute their energy. This applies to sprint races, and middle and long distance races. For sprinters, however, the explosive features of the functioning of the muscular system, as well as the ability to show maximum effort throughout the entire competitive distance, are extremely important [3, 7].

Speed skating is a complex and very complex phenomenon from various points of view, forcing coaches to be in a constant search for methods and means that can expand their theoretical and practical knowledge [4, 8]. The latter relate to both the search for optimal movement techniques and improving the effectiveness of the training system for athletes as a whole [6].

From the standpoint of cybernetics and systems analysis, sports training represents a certain qualitative transition between the initial and final states through a number of intermediate ones [2]. Thus, during training, it is necessary to change the parameters of the athlete's physical, technical and other types of preparedness so that the increase in sports results, which is an integral characteristic of skill, is greatest. In turn, in order to make appropriate adjustments to the educational and training process that can lead to the necessary changes, it is important for the trainer to make adequate management decisions in a timely manner [5].

As stated in a number of works devoted to speed skating, one of such foundations when making decisions regarding the technical readiness of athletes may be information about the peculiarities of the implementation of dynamic parameters during take-off [1, 9].

Objective of the study was to identify the possibilities of correcting movement patterns of speed skaters using feedback on the distribution of plantar pressure in speed running.

Methods and structure of the study. The experiment consisted of two stages, conducted six weeks apart. A qualified athlete aged 23 years, specializing in all-around/long-distance speed skating, took part in the study.

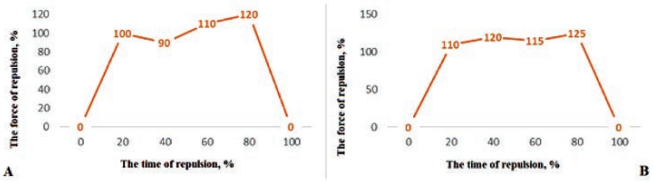
Both control sections were carried out according to the general plan. After a 15-minute ice warm-up, the athlete was alternately asked to perform a test task in speed skating 400 meters on the move in the sprint style, and then in the stayer style (Fig. 1). Rest between runs varied between 5-9 minutes.

Figure 1. Fragment of the study

The distribution of plantar pressure during the races was recorded at a frequency of 100 Hz using sensor insoles of the F-Scan system (Tekscan, USA). In the course of processing the obtained data separately for each foot and its regions, motor cycles were identified separately for each race, as well as when overcoming straight sections of the distance and turns. Transitional steps before the change of each segment were excluded from the analysis.

Features of the pressure distribution in the area of the sole of a skating boot are presented in the form of the dependence of the horizontal component of the ground reaction force averaged between the left and right foot on the time between placing the skate on the ice and the moment of its removal (the cycle time is reduced to 0 100%). The values are averaged, since there is currently no evidence that bilateral asymmetries have an exclusively negative effect on either competitive performance or a possible increase in the risk of injury on this basis [10].

Results of the study and discussion. The force of repulsion within the framework of a sliding step is not constant in its magnitude and at the end of the phase of single-support repulsion with the metatarsal part of the foot (before placing the skate of the swing leg on the ice) can reach maximum values of 120-150% of the athlete's body weight. In Fig. In general, according to known data, Figure 2 shows the dependence of the change in repulsion force on time when running in a straight line and turning [4].



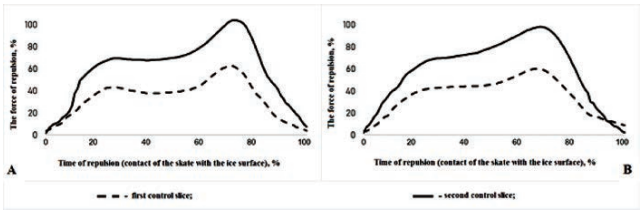
A – straight; B – turn

Figure 2. Dependence of repulsion force on time at different sections of the competitive distance

The model presented above served as a starting point for improving the athlete's movement technique during the six-week period between control sections. Figure 3 shows the results of this work.

When running in a straight line, as a rule, two pronounced maxima are observed on the repulsion force curve. The first is a consequence of loading the swing leg with body weight when placing it on the ice. The push-off force reaches its second peak as a result of active work by the metatarsal part of the foot.

When running around a turn, the magnitude of the repulsion force is on average higher than along a straight section of the distance. In addition, on a straight line, upon reaching the first peak, there is usually a slight decrease in the magnitude of the force, due to the nature of the movements in the free sliding phase, during which the athlete is only preparing for the subsequent push-off with the metatarsal part of the foot. Since this phase is absent when running around a turn, the graph between the peaks has a more straightforward form [7].



A – straight; B – turn

Figure 3. Dependence of the athlete's repulsion force on the time of skating at various distance segments

A similar pattern of effort implementation can be observed in our subject both during the first and second control sections. The changes that occurred during the training work were reflected in the almost parallel transfer of the graph of the repulsion force function in the positive direction along the vertical axis. In such a case, it would be fair to assume that the noted transformation resulted from an increase in strength indicators themselves, and not due to the fact that the athlete began to better realize the level of strength fitness available to him by reorganizing his movement pattern. However, the second assumption is supported by the increased magnitude of the force at the moment the swing leg is fully loaded with body weight when placing it on the ice (the first peak, observed after approximately 20-25% of the take-off time). It is at this moment that, due to the specifics of the movements, the athlete does not need to generate forces exceeding his body weight.

However, it is important to note that despite the positive changes, the horizontal component of the ground reaction force at the moment of loading the swing leg is still less than body weight. The nature of this phenomenon is not clear and may be associated with features: the inclination of the skate to the plane of the ice surface, maintaining balance, etc.

Conclusions. The use of feedback techniques in correcting the distribution of plantar pressure during push-off in locomotion on ice makes it possible to achieve certain shifts in movement organization patterns in skilled speed skaters. However, research in this direction should be continued to clarify the nature of the influence of such shifts on sports results.

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Development of psychophysical and technical and tactical potential of student martial arts athletes

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Abstract

Objective of the study was to experimentally substantiate the methodology for developing the psychophysical and technical-tactical potential of student martial arts athletes.

Methods and structure of the study. The experiment, which was conducted at Peter the Great St. Petersburg Polytechnic University, involved 114 students involved in martial arts, who made up the control (CG) and experimental (EG) groups. During the study, an original methodology was developed aimed at improving the construction of movements through sensory-cognitive, motor-functional and motor-coordination components in the process of educational, training and competitive activities.

Results and conclusions. It was found that classes according to the developed program made it possible to increase indicators in the EG, characterizing the level of development of mental (5.04-18.68%), physical (5.12-20.35%) and technical-tactical (12.38-21. 38%) of students' potential in comparison with indicators in the CG - mental (3.25-12.38%), physical (3.69-15.26%) and technical-tactical (7.25-12.38%) potential.

Thus, the conditions for the development of psychophysical and technical-tactical potential among student martial artists during training sessions are: the use of special exercises in changing conditions with modeling situations of alternative uncertainty associated with varying the motor composition of response actions; reduction of time for solving a psychomotor task in a certain sequence (situation - attacking actions - defensive actions - plot of the fight - task being solved).

Keywords: *psychophysical potential, psychophysical qualities, methodology, algorithm, psychomotor, conditioning and coordination abilities, students, martial arts athletes.*

Introduction. In the current conditions of reforming higher education, the importance of the psychophysical potential of student-athletes is being significantly updated, the basis of which, first of all, is the optimal level of development of their psychomotor, conditioning and coordination abilities [8]. The integration of these abilities represents a complex structural and functional system of the psychophysical potential of students involved in martial arts. Thus, according to many authors, martial arts students must have a high level of development of psychophysical qualities in order to effectively implement technical and tactical actions in competitive wrestling [5, 7].

The limiting component of the psychophysical qualities of martial arts students in the aspect of readiness for competitions is the level of systemic-structural interrelation of mental and physical components that characterize motor and functional readiness, mental processes, sensorimotor and the ability to control motor actions in different conditions of solving technical and tactical problems [2, 8].

In the structure of the psychophysical qualities of martial arts students' readiness, the main integrator of mental and physical potential is coordination abilities, the high level of which ensures the effective implementation of technical and tactical tasks in a sports match [1, 6]

During competitive wrestling, a combat sportsman must effectively and variably perform technical and tactical actions in symbiosis with speed of reaction, accuracy of movements, restructuring of motor actions, orientation in space, coordination of movements, a sense of balance, which, in turn, will allow him to react rationally to changes during the confrontation [3, 4].

Modern approaches to determining the psychophysical potential of martial arts athletes are based on methods for diagnosing abilities that make it possible to obtain the necessary predictive information in order to individualize the approach to the educational and training process. At the same time, experience shows that it is unreasonable to expect a highly qualified martial artist to enter the university, an already formed one whose psychophysical readiness is at a high level, and therefore it is important to "assess, develop, develop" the necessary psychophysical qualities of the student in the process of practicing martial arts at different stages studying at a university.

Objective of the study was to experimentally substantiate the methodology for developing the psychophysical and technical-tactical potential of student martial arts athletes.

Methods and structure of the study. The ascertaining experiment was conducted at Peter the Great St. Petersburg Polytechnic University with the participation of 3rd-4th year students (n=114) involved in martial arts. Based on the experimental data obtained, two groups were formed (experimental - EG (n=30) and control - CG (n=30). Educational and training sessions in the EG were conducted according to the developed author's methodology, and in the CG - in accordance with traditional approaches to physical training of martial arts athletes.

During the study, to determine the level of psychophysical and technical-tactical potential of martial arts athletes, control tests were used that meet the requirements of sports metrology (reliability and validity) and are widely used in practice:

– to assess the level of the **mental component** of the psychophysical potential of martial arts athletes, the complex computer psychodiagnostic program Effecton Studio 2007 was used: sensorimotor abilities and functional state of the neuromuscular system: idle visual-motor reaction "Shooting Range", ms; complex visual-motor reaction "Taxi", ms; reaction to a moving object "Stuntman", ms; tapping test "Woodpecker"; mental cognitive processes: switchability and distribution of attention "Red-black table", p. stability of attention under time pressure "Navigator", %; accuracy of time perception "Fishing",%; accuracy of dimensional perception (RD) "House", %;

– to assess the level of the **physical component** of the psychophysical potential of martial arts athletes, the following tests were used: speed abilities (running 10 m and 20 m, sec); general endurance (1500 m run, s); speed endurance (10x10 m, s); speed-strength abilities (standing jump, Watt/ms/%); strength abilities (pull-ups while hanging on a bar, n; dynamometry, kg); flexibility (FMS-test, n); coordination abilities (rhythm, s; balance, %; restructuring and adaptation of motor actions, s; speed of response, cm; coordination, %; orientation in space, %; differentiation, %));

– to assess the level of **technical and tactical potential** of martial arts athletes, the following tests were used: throw of a dummy through the hip for 1 minute (effectiveness of the throw for a while), 10 throws of a dummy by bending backwards (speed of implementation of a technique), throw of a dummy (of greater weight) through the hip within 1 minute" (rationality of technique, taking into account weight); attacking techniques, cu; deceptive attacking techniques, c.u.; deceptive attacking techniques during a fight; defensive techniques, cu; deceptive defensive techniques, c.u.; deceptive defensive techniques during a fight, c.u.; speed of transition from defensive techniques to attacking actions, c.u.

The experimental methodology includes four interconnected stages (see table):

Stage 1 – diagnostic, includes diagnostics of psychophysical and technical-tactical potential at different stages of training (based on the algorithm of the information and diagnostic system);

Stage 2 – analytical, involves building an individual profile of martial artists and selecting means and methods for their improvement;

Stage 3 – correctional, contains an individual set of means and methods (polystructural and multifunctional physical exercises);

Stage 4 – control stage, aimed at assessing the effectiveness of the training process using the proposed methodology for developing psychophysical and technical-tactical potential.

The developed author's methodology is based on the individualization of sports training methods using variable means of various motor orientations. The percentage of training agents is basic and may vary depending on the results of diagnosis and control.

The presented approach to the construction of the author's methodology using means of different directions, in our opinion, should lead to an increase in the reserve level of the psychophysical and technical-tactical potential of martial arts athletes, which can be the basis for building the functional basis of competitive motor action.

Results of the study and discussion. At the beginning of the pedagogical experiment, the comparative level of development of the psychophysical and technical-tactical potential of martial arts athletes in the EG and CG was statistically unreliable ($p>0.05$).

Experimental methodology for developing the psychophysical and technical-tactical potential of martial arts athletes

Algorithm of the experimental technique			
Stage 1 «diagnostic»	Stage 2 «analytical»	Stage 3 «corrective»	Stage 4 «control»
Stage 3 correctional (variable approach of psychophysical and technical-tactical potential) 2 times a week for 60 minutes at all stages of preparation			
1 block – psychophysical potential (psychomotor, conditioning and coordination abilities) – 30% (1440 min)		Block 2 – technical and tactical potential (attacking and defensive technical and tactical actions) – 30%(1440 min)	
Block 3 – Conjugate psychophysical and technical potential – 40% (1920 min)			
Variability of task formulation and conditions for performing basic movements (2 times a week for 60 minutes at all stages of preparation) – 4800 minutes			

During the pedagogical experiment, it was found that the martial arts athletes from the EG significantly ($p<0.05-<0.001$) improved the dynamics of indicators characterizing the level of development of psychophysical and technical-tactical potential in 38 out of 44 indicators, in contrast to the CG in 10 indicators out of 44. This circumstance allows us to say that classes according to the developed program allowed us to increase indicators in the EG, characterizing the level of development of mental (5.04-18.68%), physical (5.12-20.35%) and technical -tactical (12.38-21.38%) potential of students in comparison with indicators in the CG - mental (3.25-12.38%), physical (3.69-15.26%) and technical-tactical (7 .25-12.38%) potential.

Conclusions. The conditions for the development of psychophysical and technical-tactical potential among student martial artists during training sessions are: the use of special exercises in changing conditions with modeling situations of alternative uncertainty associated with varying the motor composition of response actions; reduction of time for solving a psychomotor task in a certain sequence (situation - attacking actions - defensive actions - plot of the fight - task being solved).

The author's methodology, aimed at improving the construction of movements through sensory-cognitive, motor-functional, and motor-coordination components in the process of educational, training and competitive activities, contributes to increasing the psychophysical and technical-tactical potential of martial arts athletes' readiness.

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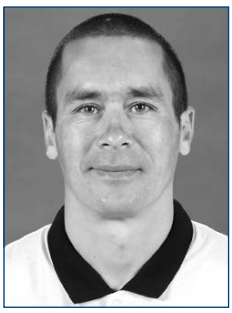
Influence of indicators of successful combat for the ball on the performance of matches in the Russian premier football league

UDC 796.015



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Abstract

Objective of the study was to identify the relationship between teams' performance in successful martial arts and the results of matches in the Russian Premier Football League (RPL).

Methods and structure of the study. Based on the results of 120 matches of the first round of the 2023-2024 RPL season. analyzed statistical indicators for martial arts provided by the official RPL data provider, the Yandex Plus - Vsporte platform. The data was processed using mathematical statistics methods using Microsoft Excel Office 365.

Results and conclusions. As a result of the study, it was found that only in 47 matches out of 115 (40.9%) the teams that had an advantage in martial arts won. Moreover, in 68 matches out of 115 (59.1%), teams that had a higher percentage of successful combats reduced the match to a draw (33 matches, 28.7%) or lost it (35 matches, 30.4%). In 5 matches there was equality in the percentage of successful combats (50/50), but none of these matches ended in a draw. The results of the study do not confirm the presence of any relationship between the advantage of teams in successful martial arts in general and the results of matches.

Keywords: *football, RPL, martial arts, statistical indicators.*

Introduction. In terms of the variety of motor skills, football is one of the most complex sports. At the same time, the football player has to perform almost all actions in conditions of confrontation. Among specialists in the field of football, there is a widespread opinion that victory in a match is ensured by a complex of martial arts won [1]. This statement is based on the fact that it is precisely such an indicator as the effectiveness of martial arts that maximally reflects the level of technical and tactical skill of football players and their physical fitness, which, in turn, largely determines the success of a football team. However, we were unable to find scientific works devoted to the topic of martial arts in football and other team sports, and scientifically based data on the relationship between effectiveness in game martial arts and the final result of matches. In this regard, it is necessary to establish whether the results of matches depend on the successful conduct of martial arts in general.

Objective of the study was to identify the relationship between teams' performance in successful martial arts and the results of matches in the Russian Premier Football League.

Methods and structure of the study. The scientific work was carried out in the second half of 2023 based on statistical indicators of 120 matches of the first round of the 2023–2024 RPL season, provided by the official RPL data provider, the Yandex Plus - Vsporte platform, from July to November 2023. Statistical analysis of the data was carried out using Microsoft Excel Office 365.

Martial arts refers to any type of struggle between football players on the field, including the fight for neutral balls (including in the air), dribbles, tackling and losing the ball when tackling the opponent. The number and percentage of successful combats in general are recorded, including combats below and above (the fight between two opponents for the ball

above shoulder level), in attack and defense, as well as by zones of the field.

Results of the study and discussion. In total, during the first round of the 2023–2024 RPL season, which consisted of 15 rounds (8 matches each), 120 matches were played, that is, each of the 16 RPL teams played 15 matches (one match with each team). During the average playing time of the match 98±2 minutes, 152.3±25.6 combats were recorded, including 105.6±19.2 combats at the bottom and 46.7±16.3 combats at the top. In 115 matches, the advantage in martial arts was on the side of one of the teams, and in 5 matches in martial arts there was equality (50/50). On average, the advantage of one of the teams in terms of the number of successful duels in the match was 7.5% (53.75/46.25).

Teams that had an advantage in single combats won only 47 matches out of 115 (40.9%). Accordingly, in 68 matches (59.1%), teams that had a higher percentage of successful combats reduced the match to a draw (33 matches, 28.7%) or lost it (35 matches, 30.4%).

In 53 matches (44.2% of the total number of matches), the advantage in successful single combats of one of the teams was 8% or more, that is, it was significant. At the same time, only 23 times teams that had a significant advantage in single combats won a victory, 17 times they tied and 13 times they lost. The maximum advantage in martial arts was 34% (67/33), and in this match the result was a draw - 1:1 (Table No. 1).

The team's advantage in successful martial arts by 6% (53/47) was observed in 17 matches, and 4

Match results and percentage of successful combats in general based on the results of the 1st round of the 2023–2024 RPL season.

Matches	1	2	3	4	5	6	7	8
Round 1	1:3 *48:52*	2:1 *54:46*	0:2 *49:51*	2:2 *46:54*	1:2 *53:47*	3:2 *53:47*	2:0 *48:52*	2:1 *48:52*
Round 2	3:3 *55:45*	0:0 *53:47*	1:1 *52:48*	1:1 *44:56*	1:4 *54:46*	2:0 *41:59*	2:3 *47:53*	2:1 *57:43*
Round 3	1:0 *53:47*	5:1 *53:47*	0:2 *52:48*	1:4 *47:53*	4:1 *51:49*	2:1 *46:54*	2:3 *49:51*	1:2 *52:48*
Round 4	3:2 *48:52*	**1:1** ***33:67***	0:2 *53:47*	3:0 *46:54*	2:0 *61:39*	2:0 *48:52*	3:1 *58:42*	2:0 *54:46*
Round 5	2:1 *57:43*	2:1 *55:45*	0:1 *56:44*	1:1 *45:55*	4:0 *54:46*	2:0 *51:49*	1:3 *46:54*	4:0 *48:52*
Round 6	1:1 *56:44*	0:0 *47:53*	4:0 *52:48*	2:2 *51:49*	0:0 *55:45*	1:0 *42:58*	2:1 *56:44*	0:1 *46:54*
Round 7	0:1 *49:51*	2:1 *46:54*	3:0 *46:54*	2:0 *46:54*	3:0 *49:51*	3:2 *55:45*	1:1 *47:53*	1:2 *57:43*
Round 8	1:1 *45:55*	2:2 *57:43*	1:1 *51:49*	1:0 *56:44*	2:2 *51:49*	0:0 *54:46*	0:3 *52:48*	0:2 *54:46*
Round 9	**2:1** ***50:50***	1:0 *48:52*	1:0 *53:47*	3:1 *49:51*	1:2 *62:38*	3:3 *55:45*	2:0 *53:47*	0:1 *47:53*
Round 10	2:2 *49:51*	3:1 *49:51*	1:0 *54:46*	0:2 *52:48*	1:0 *48:52*	2:0 *51:49*	4:0 *52:48*	1:1 *48:52*
Round 11	2:2 *49:51*	0:2 *44:56*	1:0 *48:52*	**3:2** ***50:50***	2:0 *57:43*	0:0 *52:48*	2:2 *38:62*	0:1 *51:49*
Round 12	**1:2** ***50:50***	0:0 *44:56*	0:0 *51:49*	2:2 *43:57*	1:4 *48:52*	2:0 *47:53*	3:1 *57:43*	3:0 *54:46*
Round 13	1:0 *47:53*	2:0 *58:42*	1:1 *47:53*	1:0 *52:48*	2:1 *51:49*	**1:0** ***50:50***	2:1 *41:59*	1:0 *56:44*
Round 14	1:2 *51:49*	0:2 *43:57*	2:1 *53:47*	3:2 *58:42*	1:1 *52:48*	1:1 *44:56*	0:1 *48:52*	3:3 *48:52*
Round 15	1:1 *58:42*	3:1 *51:49*	2:1 *49:51*	1:1 *58:42*	0:0 *48:52*	**2:0** ***50:50***	0:2 *48:52*	2:1 *54:46*

Note: the top lines of the cells indicate the final score of the matches, and the bottom lines (in italics) indicate the percentage of successful duels between the teams. Cells are highlighted in gray in cases where the result of the match and the percentage of successful combat matches correspond to each other, that is, the team that had a higher percentage of successful combat won the match. Matches with equality in martial arts (50/50) and a match with a maximum advantage in martial arts (67/33) are highlighted in bold.

of them ended in a draw. In 25 matches, the ratio of successful combats was 4% (52/48), but only 6 of them resulted in a draw. The minimum advantage of the team over the opponent in successful combats of 2% (ratio 51/49) was observed in 20 matches and only 6 of them ended in a draw. Equality in the percentage of successful duels (50/50) was observed in 5 matches, and in 4 of them one of the teams won with a difference of one goal, and in one match with a difference of two goals. Accordingly, with equality or a slight advantage in martial arts (6% or less) out of 67 matches (55.8% of the total number of matches), only 16 (23.9%) matches were recorded as a draw.

Out of 120 matches, 33 games ended in a draw. At the same time, in not a single match with a draw was the ratio of successful combats between the rival teams equal to 50/50, that is, one of the teams always had an advantage in the number of combats won, including in 17 matches a significant one: more than 6% (see table).

It should be noted that the study examined the performance of teams only in martial arts as a whole, without taking into account the percentage of successful martial arts of the team regarding the phase of the game (attack or defense), areas of the field (in the central zone, in the penalty area of the goal, etc.), type of martial arts (bottom or top), roles of football players (defenders, midfielders, forwards). A game in football, hockey, basketball, futsal, etc. consists of creating a scoring chance through a sequence of technical and tactical combats and its implementation [2]. A more detailed analysis of combat performance, including individual player performance, in conjunction with other key aspects (for example, phase of the game, player role, scoring chances, etc.) can potentially provide vital information for coaches and football specialists and other team sports.

Conclusions. The data presented do not allow us to assert that there is any relationship between the advantage of teams in successful martial arts in general and the results of matches. Having an advantage in single combats, including a significant one, teams quite often reduced the match to a draw or lost it, and won in less than half of such matches. Equality or a slight advantage in successful combats in most cases ended in the victory of one of the teams. Analytical analysis of matches requires a more detailed analysis of martial arts indicators.

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Implementation of an individually differentiated approach in training runners

UDC 796.012

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Abstract

Objective of the study was to develop and substantiate a model for the implementation of an individually differentiated approach in the training of highly qualified runners.

Methods and structure of the study. Participants in the experiment were members of the national track and field team of 57 student-athletes. At the stages of the study, the following were carried out: questionnaire testing and analysis of the results shown at competitions, mathematical processing of the results obtained.

Results and conclusions. The article reveals the features and patterns of training highly qualified runners. A model for implementing an individually differentiated approach in training runners is presented. External factors and individual characteristics that must be taken into account when selecting and differentiating tasks are identified.

Keywords: *individually differentiated approach, training, individual characteristics, differentiated tasks.*

Introduction. Modern requirements for elite sports, in athletics in particular, force us to pay special attention to the training of highly qualified athletes. The growing level of sports achievements, the time limit, require a search for the most rational means and methods aimed at the effectiveness of the training process. Modern developments in coaching practice, various approaches to the use of well-known methods and new technologies in the preparation of high-class athletes do not always allow achieving the desired sports results.

Often, a Russian trainer does not have expensive diagnostic equipment, modern simulators, or advanced recovery tools in his arsenal. Therefore, a contradiction arises:

- there are many methodological developments for training high-class athletes, but the conditions in which the training process takes place do not allow them to be maximally adapted to a specific athlete;

- there is a stereotype in the physical and technical training of runners at various distances, but the individual characteristics of the athlete, given his initial abilities, do not allow him to achieve high sports results;

- the level of physical fitness of the athlete indicates an expected effective performance, but the result at the competition is unsatisfactory.

Individual approach and differentiated learning are considered in many scientific works [1, 3, 4, 5]. The modern training process is based on the basic principles of physical education, where the principle of individualization occupies a special place [3]. Therefore, it is relevant to implement an individually differentiated approach in the preparation of highly qualified runners. The training of athletes should be aimed at using training means that are adequate to competitive exercises and have a targeted effect [6]. It is necessary to rationally use means and methods that have an optimal training effect, plan the actually available use of restorative means, in accordance with the preparation stage.

Objective of the study was to develop and substantiate a model for the implementation of an individually differentiated approach in the training of highly qualified runners.

Methods and structure of the study. Experimental research work to develop and search for ways to implement an individually differentiated approach for highly qualified runners was carried out in 2020-2023. on the basis of the Ural Federal University. The participants in the study were members of the track and field team of 57 student-athletes. At the stages of the study, the following were carried out: questionnaire testing and analysis of the results shown at competitions, mathematical processing of the results obtained.

Results of the study and discussion. The study identified individual characteristics and factors that determine the implementation of an individually differentiated approach in the training of highly qualified runners.

Individual characteristics:

1) physical fitness,

2) biomechanical features (running technique),

3) anatomical (physical development) and functional features, metabolism,

4) psychological characteristics.

External factors:

1) situation (life, environment),

2) training conditions (location and equipment),

3) techniques, methods, means of training,

4) rehabilitation measures and nutrition,

5) circumstances beyond our control (accident).

It was further revealed that the individual characteristics of an athlete are interconnected with each other and with the influence of external factors. A change in one factor directly affects a change in another, which in turn requires a comprehensive differentiation of the entire training process. Based on this, a model for implementing an individually differentiated approach was developed (Fig. 1).

In the course of our research, practical recommendations were developed for the implementation of an individually differentiated approach in the process of training runners:

1. The trainer needs to constantly improve the level of his knowledge both at the level of fundamental sciences and highly specialized ones. Learn about the possibilities of using modern methods and technologies in the training process.

2. In accordance with the parameters of individual characteristics and factors that determine the implementation of an individually differentiated approach in the training of highly qualified runners presented in Table 1, it is necessary to clearly imagine the model (Fig. 1) of training a particular athlete, individual characteristics of influence and interaction when differentiating tasks.

3. In accordance with the principles, develop a training methodology, select and build a system of certain methods and methodological techniques, using highly differentiated exercises used in a certain sequence and dosage (volume and intensity), aimed at increasing the effectiveness of the training process and, consequently, achieving high athletic performance result.

4. Develop highly specialized options (complexes) of differentiated tasks.

5. In the training process, the dynamics of individual indicators should be constantly monitored, and the influence of external factors should be identified. Taking this into account, the results are analyzed, which leads to adjustments to the entire training process.

Athletes took part in a study on the implementation of an individually differentiated approach in the process of training runners under the guidance of a coach, who was completely guided in his work by the recommendations and the presented model.

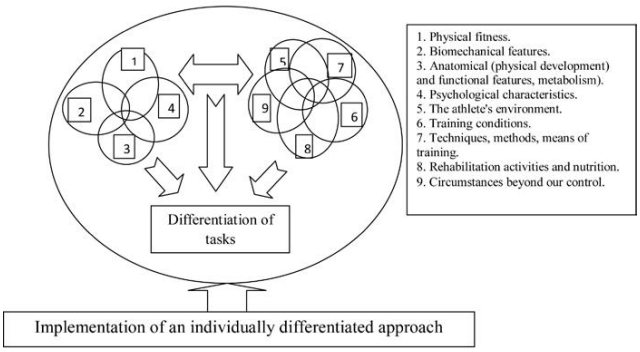

Figure 1. Model for implementing an individually differentiated approach

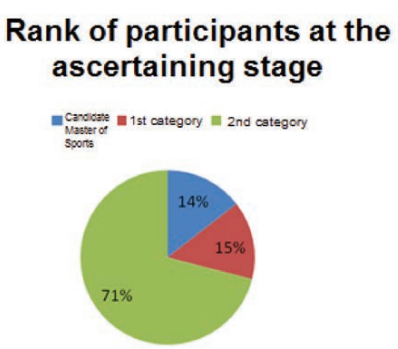

Figure 2. Sports categories of study participants

Using this approach in three years, the following were trained: two masters of sports of international class (and one of the athletes was "written off" as unpromising until that moment at the age of 25); three masters of sports, 17 candidates for master of sports, 26 people completed the first category.

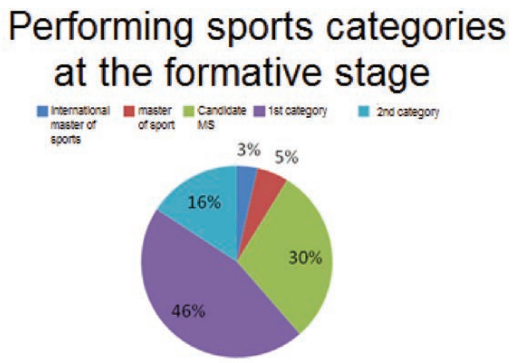

Figure 3. Performance of categories in running events by study participants

Conclusions. Modern achievements in world athletics indicate a significant increase in scientific and methodological research in this area. It is necessary to deeply study these researches and more effectively implement them in practice. Which, in turn, requires a special approach to the entire training process.

Determining individual characteristics and factors influencing the training process is very important and requires a highly differentiated focus. As practice has shown, the implementation of an individually differentiated approach in the training process will optimize the process of training runners, which in turn will lead to the emergence of new, possibly great, athletes.

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The correlation of physical development and results of the training process of young gymnasts

UDC 796.6

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Abstract

Objective of the study was to evaluate the influence of compensatory exercises on the harmony of physical development and the efficiency of the body parts of young gymnasts as a single kinematic system.

Methods and structure of the study. 24 young gymnasts aged 13.5±0.5 years with anthropometric indicators: height – 155.6±7.5 kg; weight – 48.4±7.5 cm; chest girth – 81.7±5.9 cm. A method was used based on the distribution of all variants of the studied indicator into ranges from minimum to maximum values. To train and assess the ability to muscle balance and joint flexibility, the following were used: Romberg test; Kraus-Weber test, leg abduction in the supine position; leaning forward while sitting; twisting of the torso; tilts to the side.

Results and conclusions. The sporting achievements of young gymnasts at the age of 13 are largely determined by rational technique corresponding to morphological data, as well as biological development, the primary prerequisites of which are anthropometric characteristics. Compensatory exercises, used with a specialized focus on the development of the main muscle groups included in the kinetic links of performing gymnastic combinations, are one of the training options and can reduce the negative impact of unidirectional load on young gymnasts.

Keywords: *young gymnasts, anthropometric indicators, harmony of physical development.*

Introduction. Various sports have developed model characteristics that are used to predict the potential performance of athletes. The analyzed data includes anthropometric and morphological indicators of young athletes, which to a certain extent determine the processes of development of strength and speed qualities, endurance, flexibility, and adaptation to training loads. Factors of biological development also influence the increase in performance, the course of recovery processes and the performance results of athletes [2, 4, 6, 7].

Control of the dynamics of anthropometric and morphological indicators induces systemic monitoring of physical development. This allows not only to recommend this or that sport to beginner athletes, but also to make corrections in the training process [1, 9].

High unidirectional loads in artistic gymnastics cause overstrain of the musculoskeletal system in young athletes, especially the muscles of the trunk, shoulder girdle, and lumbar spine, which can affect a decrease in athletic performance. Muscle imbalance occurs due to a decrease in the elasticity and active tone of the postural muscles, which counteract the reaction force of the projectiles and maintain the position of the gymnast's body in space [3, 5].

To train the main muscle groups included in the kinetic stages of performing gymnastic combinations, including on apparatus, it is advisable to use compensatory exercises that affect not only the passive part of the musculoskeletal system, but also the active segment of the system, consisting of the corresponding muscle groups [8].

Objective of the study was to evaluate the influence of compensatory exercises on the harmony of physical development and the efficiency of the body parts of young gymnasts as a single kinematic system.

Methods and structure of the study. 24 young gymnasts aged 13.5±0.5 years with the following anthropometric indicators took part in the scientific experiment: height – 155.6±7.5 kg; weight – 48.4±7.5 cm; chest circumference – 81.7±5.9 cm; hip circumference – 83.2±4.3 cm; hanging at an angle on the bar on the right hand – 20.6±4.6 s; hanging at an angle on the bar on the left hand – 12.8±2.3 s.

To assess the harmonious physical development of young gymnasts, a method was used based on the distribution of all variants of the studied indicator across ranges from minimum to maximum values using a mathematical procedure dividing the scale into 100 equal parts. This method was used to identify an increase in anthropometric indicators of body weight, height, chest and hip girths, as well as a gymnastics-specific exercise in hanging on the crossbar, which were used to assess the harmonious morphological development of the body of young gymnasts.

The percentile table made it possible to distribute young athletes according to the studied indicators into the appropriate groups. The scale used provided range limits expressed in percentiles: 0 – 25 – 50 – 75 – 100%. Physical development was monitored using a unidimensional percentile scale.

The proportionality of physical development was determined by the maximum difference between the values of the percentile scales for height, body weight, chest girth and hip girth and was assessed as: 0 – 50 harmonious development; 75 – heterogeneous development; 100 – accelerated heterogeneous development.

To train the ability to muscle balance and flexibility in joints, the following means were used: Romberg test; Kraus-Weber test, which includes six items; abduction of the leg in a lying position; leaning forward while sitting; twisting of the torso; tilts to the side.

The gymnasts performed compensatory exercises to strengthen the trunk muscles and improve flexibility and mobility in the joints for 30 minutes twice a week.

The effectiveness of the training program was assessed by indicators of discrimination of the main parameters of movement: time, amplitude and speed of performing elements on gymnastic apparatus.

Results of the study and discussion. As the variance of the distributed random variable (percentile) changed, percentage performance was expressed as a median ranging from 3% to 97%. This indicates the location of the gymnasts within the reference group. The studied indicators, related to the average morphological profile, can be considered an indicator of a high degree of physical development.

The physical development of gymnasts turned out to be predominantly heterogeneous or simultaneously accelerated and heterogeneous in chest and hip girths. The numerical difference between the percentile intervals between the values of the 25-50% and 50-75% ranges showed the harmonious development of the gymnasts' height and body weight indicators.

Studying the development features of the musculoskeletal system of young gymnasts based on assessing the ability to muscle balance, the level of development of flexibility and mobility in the joints, is a means of increasing the effectiveness of training activities. Binary assessment of compliance with model indicators of age development of young gymnasts ("complies" – "does not correspond") indicates the successful completion of motor tasks by athletes.

The table shows statistically significant changes that occurred as a result of the use of corrective exercises.

Statistically significant changes were recorded in the sitting forward bend. According to research, the results of tests characterizing the general flexibility of gymnasts can be classified as above average. However, changes in the amplitude of lateral trunk bending caused by corrective exercises were not statistically significant.

Compared with the results of hip mobility tests presented in previous studies, the test data obtained for young gymnasts were classified as average. Upon completion of the corrective program, a statistically

Table 1. *Dynamics of anthropometric indicators of young gymnasts*

Indicator		Before	After	t
Leg abduction in a lying position, degrees	right	95,6±9,8	102,9±13,5	1,8
	left	95,8±8,7	100,5±10,2	0,6
Bend forward while sitting, + cm		18,7±3,6	21,4±8,9	2,3
Torso turns left-right, n/min		79,5+5,3	87,3±6,2	1,7
Tilt of the body to the side, degrees	to the right	37,6±3,4	38,7±1,4	1,9
	to the left	37,2±6,9	37,9±7,8	4,6

significant improvement in mobility in the hip joints was observed ($p<0.05$).

Despite the initial discrepancy in the indicators in the duration of holding an angle hang on one arm, in tests for the magnitude of the inclination towards the side, no statistically significant differences were established between inclinations to the right and left. This is due, as a rule, to the symmetrical power work of the hands on apparatus, in contrast to representatives of team sports, who have functional asymmetry in the work of the limbs, established by numerous studies.

The study of the results of instrumental measurements of the ability to distinguish between amplitude, time and muscle effort when performing exercises on gymnastic apparatus revealed statistically significant changes in the skills of coordinating control of the own movements of young gymnasts.

Conclusions. The sporting achievements of young gymnasts at the age of 13 are largely determined by rational technique corresponding to morphological data, as well as biological development, the primary prerequisites of which are anthropometric characteristics.

Assessment of the functional state of the musculoskeletal system of young gymnasts is the basis for the development of training tools, including moving, stabilizing and strengthening forms of exercises.

Compensatory exercises, used with a specialized focus on the development of the main muscle groups included in the kinetic links of performing gymnastic combinations, are one of the training options and can reduce the negative impact of unidirectional load on young gymnasts. The method of compensatory tests can be used to monitor the growth of individual parameters of physical development depending on the somatic characteristics of young gymnasts.

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Biological bases of optimization of training loads of athletes

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Abstract

Objective of the study was to study the main approaches of coaches in Belarus and China to taking into account the biorhythmic characteristics of the body of athletes when planning their training process and to determine the dynamics of the manifestation of speed-strength abilities during OMC in female athletes specializing in various sports.

Methods and structure of the study. A questionnaire was developed and a survey was conducted of coaches (n=16) involved in training female athletes in the Republic of Belarus and specialists (n=12) who train female hockey players in China. Also, to determine well-being, changes in mental state, performance, tolerance of training and competitive loads in various phases of the body's biorhythmics, a survey and testing of 18 qualified Belarusian female runners at various distances and 23 Chinese female hockey athletes was conducted.

Results and conclusions. Analyzing the data from a survey of coaches, it can be stated that most specialists, when planning the training process, do not take into account the phase nature of the ovarian-menstrual cycle of female athletes, which negatively affects the tolerance of the proposed loads, the functional state and well-being of girls. The results of the survey and the results of testing of female athletes indicate the presence of significant phase changes in the indicators of motor abilities of female runners and hockey players in each of the phases of the ovarian-menstrual cycle.

Keywords: *female athletes, training, questioning, characteristics of the female body, OMC.*

Introduction. It is known that adaptation processes and the activity of functional systems in the body of women differ from those in men, which is due to the main biological feature of the female body - the presence of reproductive function, which is quite complex in its neurohumoral regulation [4, 5]. Studies by many authors have shown that the cyclical nature of the processes corresponds to the phases of the biological rhythm and affects not only the general condition of the woman's body, but also its individual organs and systems, which largely determines the performance and magnitude of the manifestation of motor qualities in female athletes [2, 3, 6, 7]. Thus, it is obvious that in practical activities, coaches need to take into account the biorhythmic characteristics of the body of a particular athlete, which significantly influence sports performance.

Objective of the study was to study the main approaches of coaches in Belarus and China to taking into account the biorhythmic characteristics of the body of athletes when planning their training process and to determine the dynamics of the manifestation of speed-strength abilities during OMC in female athletes specializing in various sports.

Methods and structure of the study. A questionnaire was developed and a survey was conducted of coaches (n=16) involved in training female athletes in the Republic of Belarus and specialists (n=12) who train female hockey players in China. Also, to determine self-assessment of well-being, changes in mental state, performance, tolerance of training and competitive loads in various phases of the body's biorhythmics, a survey and testing of 18 qualified Belarusian runners at various distances and 23 Chinese

athletes involved in hockey were conducted. The age of the subjects is 16-20 years, and their sports experience is 3-9 years.

Results of the study and discussion. Analysis of the questionnaires of coaches from Belarus and China allowed us to obtain the following data. Thus, 68.8% of surveyed Belarusian and 58.3% of Chinese specialists, when planning their work, do not take into account the phases of female athletes' OMC. Accordingly, 12.5 and 16.7 percent take into account, and 18.8 and 25.0% use information about the cycle partially, depending on the characteristics of its course. It is characteristic that 75.0% of respondents from the Republic of Belarus and 83.3% of the People's Republic of China are convinced of the mandatory conduct of training sessions during the menstrual phase, the rest do not see the need for this or approach this issue individually, depending on the well-being of the athlete.

The respondents spoke about the optimal amount of load during the menstrual phase of the OMC as follows. Thus, 43.8% of Belarusian and 41.7% of Chinese trainers believe that training influences during this period should be reduced by half, respectively, 25.0 and 16.7% reduce the load volume by 20-30 percent of the maximum, the remaining respondents of two countries do not change the planned volume depending on the psychophysiological and physical condition of the athletes.

It was revealed that 56.3% of Belarusian and 58.3% of Chinese trainers consider the use of technical simulation exercises, more aimed at developing flexibility, to be effective in the menstrual phase. At the same time, 18.8% of coaches of runners and 25.0% of hockey players believe that general physical training is more productive in this phase.

Without exception, all Belarusian and Chinese experts state the presence of psychophysiological changes occurring in the body of female athletes in the menstrual and, especially, premenstrual phase. Most often (as indicated by 81.3% of Belarusian coaches and 66.7% of Chinese coaches), this manifests itself in the fact that their players become irritable and psychologically unbalanced. A number of female athletes (18.8 and 16.7%, respectively) develop some lethargy, apathy towards the training process, lack of confidence in their abilities, and sometimes fear and reluctance to participate in competitions.

Many coaches (56.3% Belarusian and 66.7% Chinese) have personal experience working with female athletes in whom OMC has virtually no effect on the effectiveness of the training process. The remaining specialists from the two countries claim that absolutely all of their players are largely susceptible to the influence of the body's biorhythms on sports activities. The fact that an athlete with somatic and psychological properties characteristic of men can achieve success in sports was confidently stated by 75.0% of surveyed specialists from the Republic of Belarus and 83.3% from the People's Republic of China.

Thus, the coaches of the two countries do not have a common conceptual opinion in the approach to planning the educational and training process of female athletes in terms of the biorhythmic characteristics of the body and determining the optimal state in which the necessary training influences can be set.

To study the course of menstrual function and its relationship with the psychophysiological state of girls in various phases of the body's biorhythms, a survey was conducted among female athletes from two countries. During the experiment, they daily recorded the state of the body in self-monitoring diaries, and we kept a log of the biological cycle of the subjects.

Analysis of personal data shows that runners from the Republic of Belarus began to play sports at 10.3 years old, hockey players from the People's Republic of China at 9.5 years old, and the OMC stabilized in the majority of girls in the two countries by the age of 14-15 years. The duration of OMC in 55.6% of female runners and 56.5% of female hockey players is 27-29 days. Accordingly, 22.2% and 30.4% have 23-26 days, 16.7% and 8.7% have 21-22 days, and 5.6% and 4.3% have more than 30 days.

It should be emphasized that a shortened OMC (21-22 days) in itself is difficult for planning the training process, and the presence of any violations of the specific biological cycle of an athlete aggravates these difficulties.

The duration of menstruation in 68.3% of all female athletes surveyed is five days, 14.6% - four days, 9.8% - three days, 7.3% - six to seven days. At the same time, 85.4% of female athletes feel a deterioration in their health before and during menstruation, pain in the pelvis, and headaches. A decrease in performance accompanies the premenstrual phase in 65.9 percent and the menstrual phase in 87.8 percent of respondents. All athletes participate in competitions regardless of the phase of the cycle, however, 85.4% of girls

Indicators of upward jump height (cm) in different phases of OMC among female athletes

Phases of OMC	Before training		After training	
	Runners	Hockey players	Runners	Hockey players
	$\bar{X}$±S	$\bar{X}$±S	$\bar{X}$±S	$\bar{X}$±S
I	39,7±2,8	38,2±2,5	36,5±2,7	35,8±2,9
II	43,4±1,1	42,2±1,6	42,8±1,0	41,9±1,8
III	41,1±1,3	40,1±1,7	39,3±1,5	38,7±1,9
IV	45,0±1,2	44,2±1,6	43,9±1,4	43,1±1,6
V	40,3±2,0	40,6±2,1	37,2±2,3	38,3±2,1

note that during menstruation this causes faster and deeper fatigue, and the recovery process takes longer than usual.

Analysis of data on psycho-emotional state showed the following. 26.8% of respondents complain of increased fatigue, imbalance and unreasonable irritability in phase I (menstrual), in phase II (postmenstrual) - 4.9%, in phase III (ovulatory) - 12.2%, in phase IV (postovulatory) - 7 .3% and in V (premenstrual) – 48.8% of female athletes.

According to the subjective sensations of hockey players, during the ovulatory, premenstrual and menstrual phases of the cycle, their physical and emotional state worsens, against the background of which precise spatial orientation decreases, muscle sensations worsen, the time when athletes play slowly increases, and, consequently, the performance of individual players decreases and the team as a whole.

As for female runners, according to their perception, the best manifestation of special motor qualities is expressed in the II and, especially, IV phases of the cycle, while in the I, III and V phases there is a decrease in the realization of dominant abilities. It is characteristic that, according to research data [1, 3, 7], it is the postmenstrual (II) and postovulatory (IV) phases of the cycle that are characterized by a high level of hormone concentration.

Interesting data were obtained when analyzing the results of the Abalakov jump, which the athletes performed daily before and after training (see table). Not only the OMC phase in which the jump test was carried out was taken into account, but also the volume and direction of training influences during this period.

It was revealed that the height of the upward jump before training fluctuates on different days of the cycle among athletes of the two countries from 38.2 to 45.0 cm, after training - from 35.8 to 43.9 cm. In both cases, the lowest results are shown in the menstrual period (I), and the highest – in the postovulatory phase (IV). It is significant that the greatest difference was recorded in the jumps that were performed after training, and the greatest variability in performance was observed during the menstrual phase. Moreover, the most significant variation was recorded after training, which is associated both with the implementation of training influences that differ in volume and direction, and with the individual reaction of the athlete's body to them.

Thus, the data of the study indicate the presence of phase changes in the indicators of the motor abilities of female athletes during the OMC, and the strongest influence of training loads on their motor potential is observed during the period of unfavorable phases of the body's biorhythmics.

Conclusions. It can be stated that in their work with the female contingent, coaches do not focus on OMC, which negatively affects the functional state of female athletes and, as a consequence, their sports performance. At the same time, the training process, organized taking into account the biorhythmic characteristics of the female body, will not only ensure higher overall performance, the proper level of special preparedness of female athletes, but will also preserve their reproductive health. At the same time, monitoring the individual dynamics of the functional indicators of a particular athlete in various phases of the biological cycle and, in connection with this, the individualized focus of the applied training influences, largely optimize strategic approaches in preparing for the main competitions of the season.

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A model for completing the playing links of the women's student team in mini-football

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Abstract

Objective of the study was to develop and justify a model for recruiting the playing links of a women's student team in mini-football (futsal).

Methods and structure of the study. Scientific work was carried out on the basis of the women's student mini-football (futsal) team of the Moscow Polytechnic University (Moscow) during 2023. Using the modeling method, the playing fours of the sports team were substantiated based on the individual compatibility of the athletes.

Results and conclusions. The results of the research made it possible to establish that in mini-football (futsal), women's student teams play, as a rule, in three units, and individual indicators of physical development and preparedness in each playing unit have significant differences. Such differences determine the compatibility of players in each playing unit, which ultimately determines the specifics of recruiting the entire women's student team in mini-football (futsal).

The optimal selection of players based on morphological indicators and physical fitness allows us to build a model for recruiting the playing units of a female student team in futsal (futsal), thereby creating favorable conditions for achieving high sports results in competitive activities.

Keywords: *mini-football (futsal), sports team, model, playing links of, player compatibility.*

Introduction. Student sports in the Russian Federation has changed significantly in recent years, because... Professional athletes who are students of higher academic institutions can also take part in competitions. The inclusion of professional female athletes in student futsal (futsal) teams contributes to a significant increase in the class of the team [2, 6]. However, as practice shows, women's student teams in futsal (futsal), staffed by professional and amateur players, are not always able to show high results during competitions [1, 5].

Analysis of special scientific and methodological literature [3, 4] as well as our own observations indicate that the coherence of the game actions of a student team in mini-football (futsal) is largely determined by the compatibility of female athletes in the playing level. The most informative indicators characterizing the compatibility of players in the playing sections of a women's student team are morphological characteristics, as well as functional, physical, technical-tactical and psychological preparedness of female athletes.

Thus, noting the importance of the individual characteristics of female athletes in the process of recruiting game units, it is necessary to develop a universal model that can be effective in various conditions for the development of a female student team in mini-football (futsal).

Objective of the study was to develop and justify a model for recruiting the playing links of a women's student team in mini-football (futsal).

Methods and structure of the study. Scientific work was carried out at the Moscow Polytechnic University (Moscow) among the women's student futsal (futsal) team during 2023. At the first stage (January-

June 2023), individual indicators of physical development and preparedness of student team players were studied. At the second stage (August-October 2023), using the modeling method, the playing fours of a sports team were substantiated based on the individual compatibility of the athletes. At the third stage (November-December 2023), a model for recruiting the playing units of a women's student team in mini-football (futsal) was developed and justified.

Results of the study and discussion. The development and justification of a model for recruiting the playing units of a women's student team in mini-football (futsal) includes four stages: conceptual, diagnostic, modeling and control.

The conceptual stage includes determining the goals and objectives of recruiting the playing units of the women's student team in mini-football (futsal). The basis of the conceptual stage is an individual-integrated approach, based on determining the patterns of physical development and preparedness of female athletes aged 18-25 years.

The diagnostic stage includes the development of a set of scientific studies that make it possible to determine the indicators of individual physical development and preparedness of each player, identifying his priority indicators, which determine the compatibility of female athletes in the playing level.

The modeling stage includes the creation of a mechanism for recruiting the optimal composition of playing units based on individual compatibility in terms of physical development and preparedness of the female student team in mini-football (futsal).

The control stage made it possible to determine and evaluate the effectiveness of the previous three stages, as well as to make adjustments in the process of training athletes based on roster rotation and selection of the most compatible players within the playing unit.

Thus, the composition of the playing units is determined by the rational distribution of players in the fours that are most appropriate in terms of their individual parameters.

The results of the analysis of the morphofunctional indicators of the playing sections of the female student futsal (futsal) team indicate that the most experienced athletes (24.5±1.3 years). Length and body weight indicators among players of the women's student futsal team tend to increase from the first to the third line. Thus, among athletes of the first level of the game, the body length is 160.2 ± 3.3 cm; the second – 163.5±4.6 cm and the third – 167.9±4.0 cm, and body weight – 57.0±2.1; 59.8±2.7 and 62.6±3.2 kg, respectively (Table 1). The first gaming unit is staffed by the most experienced players with sports experience of 9.2 ± 1.6 years.

It is typical that before the start of the sports season, players of all levels experience "good" physical condition. It should be noted that the players of the first gaming link have 70% functional readiness for the season, while the second and third have 80 and 90% readiness, respectively.

Control and pedagogical tests made it possible to establish that the players of the first link of the women's student futsal (futsal) team had indicators of speed development (30 m run) - 4.56 ± 0.47 s (7 points, "high" level), significantly exceed the results shown by athletes of the second and third links - 4.82±0.49 and 4.88±0.51 s (5 points "average" level), respectively ($p<0.05$).

Indicators of coordination readiness (shuttle run 3x10 m) are significantly higher in the second and third game levels - 8.62 ± 0.47 and 8.59 ± 0.55 s (6 points, "above average" level) than in the first four - 8.86±0.52s (5 points, "average" level), respectively ($p<0.05$; Table 2).

It was established that the indicators of speed endurance (shuttle run 104m) among the players of the second - 27.4 ± 1.28 s and the third playing line - 28.3 ± 1.09 s (5 points, "average" level) are significantly in-

Table 1. Model of the composition of playing links according to the morphofunctional indicators of female athletes in mini-football (futsal)

Game link number	Age, years	Body length, cm	Body weight, kg	Sports experience, years	Physical condition and sports readiness	Functional readiness for the season, %
1	24,5±1,3	160,2±3,3	57,0±2,1	9,2±1,6	хор.	70,0
2	22,1±1,0	163,5±4,6	59,8±2,7	6,8±0,7	хор.	80,0
3	19,3±0,9	167,9±4,0	62,6±3,2	3,9±0,6	хор.	90,0

Table 2. Model of the composition of game link according to indicators of special physical preparedness of female athletes in mini-football (futsal)

Tests	Game link	Indicators	
		$\bar{X}$	Points
30 m run, s	1	4,56±0,47	7
	2	4,82±0,49	5
	3	4,88±0,51	5
Shuttle run 3x10 m, s	1	8,86±0,52	5
	2	8,62±0,47	6
	3	8,59±0,55	6
Shuttle run 104 m, s	1	26,06±1,19	7
	2	27,4±1,28	5
	3	28,3±1,09	5
Cooper test, m	1	2200±19,33	4
	2	2700±20,61	6
	3	2500±20,18	6
Standing long jump, cm	1	213,5±8,94	7
	2	206,2±8,67	5
	3	216,6±9,05	7

ferior to the results shown female athletes of the first link – 26.06±1.19 s (7 points, “high” level) ($p<0.05$).

A characteristic point is that the overall endurance indicators of the second and third playing links are at the “above average” level (6 points) - 2700±20.61 and 2500±20.18 m, respectively, which is significantly higher than that of the first playing level - 2200±19.33 m (4 points, level “below average”) ($p<0.05$).

It was revealed that the players of the women’s student mini-football (futsal) team of the first and third game levels have significantly higher speed-strength readiness indicators - 213.5 ± 8.94 and 216.6 ± 9.05 cm, respectively (7 points, “high” level), compared with the second link - 206.2±8.67 cm (5 points, “average” level) ($p<0.05$).

Conclusions. The results of the research made it possible to establish that in mini-football (futsal), women’s student teams play, as a rule, in three units, and individual indicators of physical development and preparedness in each playing unit have significant differences. Such differences determine the compatibility of players in each playing unit, which ultimately determines the specifics of recruiting the entire women’s student team in mini-football (futsal).

The optimal selection of players based on morphological indicators and physical fitness allows us to build a model for recruiting the playing units of a female student team in futsal (futsal), thereby creating favorable conditions for achieving high sports results in competitive activities.

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Individual typological features of judokas of various weight categories

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Abstract

Objective of the study was to conduct a comparative analysis of morphometric indicators among judokas performing in various weight categories.

Methods and structure of the study. The survey involved 57 judokas performing in light (up to 60 kg, up to 66 kg), medium (up to 73 kg, up to 81 kg, up to 90 kg) and heavy (up to 100 kg, over 100 kg) weight categories, aged 17-23 years old with sports qualifications of at least I adult category. All athletes had the necessary anthropometric body measurements taken. The component composition of somatotype body weight was assessed using special methods. Statistical processing of experimental data was carried out using the statistical processing package STATGRAPHICS CENTURION.

Results and conclusions. Judokas competing in different weight categories differ in body type, relative content of bone and fat mass. Therefore, a differentiated approach to the content of the training process of judokas of various weight categories should be based not only on the traditionally taken into account body weight, but also focus on individual typological features of morphology, which determines preferences in the process of studying wrestling techniques and, ultimately, affects the formation of individual competitive technical arsenal of judokas.

Keywords: *anthropometry, somatotype, physical development, judo, athletes, weight categories.*

Introduction. Recently, the problem of finding criteria for successful competitive activity in martial arts has been under the close attention of coaches, doctors and scientists [1-3]. Informative morphofunctional criteria for rapid trainability among representatives of martial arts have been identified, which makes it possible to correctly select athletes at various stages of sports training [4-6]. At the same time, the data obtained concern athletes performing in middle weight categories.

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Results of the study and discussion. The study of morphological indicators in judokas of light, medi-

Table 1. Characteristics of study participants

Weight category	Sports qualification			Number of athletes
	I category	Candidate Master of Sports	Master of Sports	
Light	5	6	4	15
Average	11	13	5	29
Heavy	5	5	3	13
Total	21	24	12	57

um and heavy weight categories revealed a number of physique features in each of these groups. Thus, when assessing the somatotype according to the classification of M.V. Chernorutsky, it was found that in each weight category there are all three body types: asthenics, normosthenics and hypersthenics. In middleweights, the predominant somatotype is normosthenic, while in lightweights it is asthenic. Among judokas competing in heavy weight categories, hypersthenics are more common than others, and asthenics are less common. Thus, among the heavyweights, 30% of athletes were normosthenics, 43% were hypersthenics, and 17% were asthenics. Among lightweights, 33% were found to be normosthenic, 25% to be hypersthenic, and 42% to be asthenic. At the same time, in each weight category there are both short-legged and long-legged judokas, as well as athletes with a relatively wide pelvis and a relatively narrow pelvis. Judokas with different body proportions can be equally successful by using technical actions characteristic of their physique. The data obtained can be explained by the diverse arsenal of judo technical actions, which, for example, is confirmed by the research of M.V. Shimchenko [8]. The author found that judokas with long legs in their competitive arsenal more often use holds, painful holds, deflection throws, a back tripe and a hook. Medium-legged athletes are best at holding, arching and over-the-back throws from the knee. Judokas with short legs win with back throws, body throws, submissions and grabs.

Analysis of the component composition of the body mass of judokas of various weight categories revealed high levels of relative muscle tissue content, regardless of the weight of the athletes. At the same time, the highest relative indicators of body fat mass were found in heavyweights, and the lowest - in lightweights (Table 2).

Conclusions. Judokas competing in different weight categories, along with the obvious difference in body weight, differ in body type, relative content of bone and fat mass. Therefore, a differentiated approach to the content of the training process of judokas of various weight categories should be based not only on the traditionally taken into account body weight, but also focus on individual typological features of morphology, which determines preferences in the process of studying wrestling techniques at the initial stage of training and, ultimately, affects on the formation of an individual competitive technical arsenal of qualified judokas.

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Table 2. Component composition of body weight among judokas performing in different weight categories (x+Sx, cm)

Morphological indicators	Weight category		
	Light (n=15)	Average (n= 29)	T Heavy (n= 13)
Fat mass, %	7,5±0,5	9,2±0,8*	12,7±0,7**
Muscle mass, %	50,5±3,1	50,0±2 ,5	48,8±2,8
Bone mass,%	21,9±1,2	17,8±0,9*	15,5±1,1**

Note: 1) n – sample size; 2) * – differences between judokas of medium and light weight categories are significant at $P < 0.05$; 3) ** – differences between judokas of heavy and medium weight categories are significant at $P < 0.05$.

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Tactical and technical indicators of boxers with different fighting styles

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Abstract

Objective of the study was to identify the characteristics of striking actions in accordance with individual styles of fighting with special training.

Methods and structure of the study. The article examines the dynamics of technical and tactical actions (characteristics of striking actions) among boxers who differ in the style of fighting. The indicated characteristics of special training (free work) were studied using the electronic punching bag "KIKTEST-100", using the "Kicktester" program. Voluntary work was assessed by the following indicators: 1) impact force; 2) sharpness of the blow; 3) impact energy; 4) number of blows; 5) total tonnage; 6) maximum impact force; 7) maximum sharpness of impacts; 8) maximum impact energy; in 3-minute free work, on a boxing bag.

Results and conclusions. The implementation of technical and tactical actions of boxers is to a certain extent connected with the stylistic characteristics of combat operations, the severity of which manifests itself in accordance with the individual psychological characteristics of the boxers. In particular, in the conditions of free work, it was revealed that higher dynamics of the studied striking actions are characteristic of boxers implementing the knockout style, in comparison with tempo fighters and, especially, with boxers implementing the play style of fighting. At the same time, differences in the implementation of fighting styles are largely associated with the individual psychological characteristics of boxers.

Keywords: *fighting style, knockouts, pacers, gamers, striking actions, special training.*

Introduction. The style characteristics of conducting a competitive fight, on the one hand, are associated with individual psychological characteristics [3, 9], on the other hand, with the effectiveness of the implementation of technical and tactical actions [2, 10]. The quality of technique and tactics, defensive and striking actions performed by highly qualified boxers during a combat match is largely determined by the development of physical abilities, the characteristics of mental, psychophysiological processes, and experience in sports activities [6, 7].

The practice of fights shows that an athlete who has a large arsenal of strikes brings more technical variety, tactical skill to the fight and increases the chances of a victorious outcome of a sports confrontation [8]. At the same time, the effectiveness of striking actions is largely associated with individual stylistic characteristics and is determined by them.

Objective of the study was to identify the characteristics of striking actions in accordance with individual styles of fighting with special training.

Methods and structure of the study. Boxers-students of the Federal State Budgetary Educational Institution of Higher Education " SibSUPhE", Omsk, aged 18-25 years, in the amount of 25 people, took part in the scientific work. The boxers' training load corresponded to the curriculum and distribution of means of physical and technical-tactical training of sports improvement and higher sports excellence groups according to the A.O. Akopyan program for children's and youth sports schools and Olympic reserve sports schools in boxing (2005) [1]. The indicated character-

istics of special training (free work) were studied using the electronic punching bag "KIKTEST-100", using the "Kicktester" program [5]. Voluntary work was assessed by the following indicators: 1) impact force; 2) sharpness of the blow; 3) impact energy; 4) number of blows; 5) total tonnage; 6) maximum impact force; 7) maximum sharpness of impacts; 8) maximum impact energy; in three-minute free exercise, on a boxing bag. Level of preparedness: I category - 8 athletes, CMS - 10, MS - 7. Correspondence to the characteristics of the fighting styles: tempo boxers - 8, gamers - 6, knockouts - 11.

Typological features of the manifestation of the basic properties of the nervous system (strength of the nervous system, mobility of excitation, mobility of inhibition, "external" and "internal" balances between excitation and inhibition) were studied using voluntary motor techniques by E.P. Ilyina (2001) [4]. Statistical processing of the experimental material was carried out using Statistics 6.0 and Microsoft Excel 2010 programs.

Results of the study and discussion. The implementation of technical and tactical actions of boxers is to a certain extent connected with the stylistic characteristics of combat operations, the severity of which manifests itself in accordance with the individual psychological characteristics of the boxers. In particular, knockout boxers often have low nervous system strength, external balance, and inertia in both the process of excitation and inhibition, which contributes to a forceful style of fighting.

The gaming style of competitive activity is more often implemented by boxers who have greater strength of the nervous system, poise in internal balance and higher mobility of the excitation process, i.e. They are more characterized by speed abilities, manifestations of speed and sensorimotor skills. Boxers who implement the tempo style are characterized by a medium-strong nervous system, balance in external and internal balances, and some inertia of nervous processes; such a typological complex and fighting style contribute to the manifestation of patience, and, consequently, endurance, which corresponds to the nature of their competitive art.

In accordance with this, it should be noted that style as a psychological phenomenon is a stable psychological system (stable, variable within certain limits), ensuring coordination of the individual characteristics of those involved with the conditions and requirements of competitive activity.

At the same time, the nature of technical and tactical actions differs significantly depending on the style of the fight. This is evident to a certain extent in relation to the effectiveness of striking actions and their characteristics, and is revealed in the results of this study (Table 1).

Thus, the power of blows is higher among boxers with pace (157.49 ± 22.0) and "knockouts" (145.56 ± 5.3) in comparison with boxers implementing the playful style of fighting (129.57 ± 25.3) $p \leq 0.05$. The sharpness of blows is more pronounced in pace boxers (58.83±6.3) than in "knockouters" (46.54±3.5) and "players" (50.35±6.5).

Such an indicator as the energy of blows is more pronounced in knockout boxers (24.08±1.6), in comparison with "players" (20.16±3.6) $p \leq 0.05$. Tempo boxers deliver more punches (186.50±14.1) than play-style boxers (165.18±22.3).

The indicator of the sum of the force of blows is significantly higher among tempo boxers (30047.50±6304.6), in comparison with boxers of the playing style (21176.73±4444.9) and "knockouts" (24238.80±3942.1), $p \leq 0.05$.

A similar ratio is observed in relation to maximum strength; it is also higher among pace boxers (375.33 ± 49.0) than among play boxers (318.73 ± 53.1) and "knockout" boxers (322.00 ± 15 ,0).

Connections between special preparedness and fighting styles in free work on a boxing bag

Special tests	Fighting styles			p≤0,05
	Players	Tempo	Knockouts	
Impact force	129,57	157,49	145,56	1-2,1-3
Sharpness of blows	50,35	58,83	46,54	1-2,2-3
Vigor of blows	20,16		24,08	1-3
Number of beats	165,18	186,50		1-2
Sum of impact force	21176,73	30047,50	24238,80	1-2,2-3
Maximum impact force	318,73	375,33	322,00	1-2,2-3
Maximum impact sharpness	196,09	211,50	193,60	1-2,2-3
Maximum impact energy	49,36	63,83	58,60	1-2,1-3

The same is typical with regard to maximum sharpness; it is higher among tempo boxers (211.50±11.7) in relation to knockout boxers (193.60±10.2) and "players" (196.09±14.6).

The maximum energy indicator is significantly higher among tempo boxers (63.83±10.7) than among play boxers (49.36±9.9), p≤0.05.

In general, the characteristics of striking actions are higher among boxers who implement a tempo style of fighting (see table).

Certain differences in the characteristics of striking actions occur according to the qualifications of boxers. However, it should be noted here that the considered characteristics of striking actions in most indicators have higher indicators for MS and CMS, in comparison with boxers of the 1st category, which corresponds to this level of preparedness.

Taking into account that striking actions are among the main actions of boxers to achieve victory, the presented research results show the connection between the characteristics of striking actions and the characteristics of the fighting style and their manifestation, reflecting the individual psychological characteristics of boxers. At the same time, most of the indicators of striking actions when performing free work are more effective in boxers of the tempo style of fighting. While knockouts have higher proficiency in the indicators 1, 3, 5, 6, 7 than boxers who implement the game style of fighting. In general, boxers-players are inferior in the analyzed indicators to both tempo boxers and "knockout" boxers.

Conclusions. The results of the study show that technical and tactical indicators and their effectiveness vary to a certain extent among boxers implementing different fighting styles; they are most pronounced among knockout boxers. An essential factor is the connection between fighting styles and the individual psychological characteristics of boxers, which to a certain extent affect the effectiveness in implementing the designated styles.

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Preparatory actions and indicators for their assessment in competitive fights of highly qualified karatekas in the olympic weight category up to 67 kg

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Abstract

Objective of the study was to determine the versatility, effectiveness and success of preparatory actions used in competitive fights by highly qualified karatekas for the successful implementation of offensive and defensive actions.

Methods and structure of the study. Pedagogical supervision was carried out over highly qualified athletes occupying leading positions in the world rankings in the weight category up to 67 kg: Assadilov Darkhan (Kazakhstan), Dacosta Steven (France), Crescenzo Angelo (Italy), El-Sawy Ali (Egypt), as well as the leader Russian national team in this competitive discipline, Honored Master of Sports Evgeniy Plakhutin. Competitive fights at the 2020 Olympic Games, world and continental championships, where athletes achieved high results, were examined.

Results and conclusions. The analysis of the competitive activity of highly qualified karatekas in the Olympic weight category up to 67 kg, who occupy leading positions in the world rankings, was carried out thanks to pedagogical observations using video recording tools, which make it possible to conduct research without interfering in the competitive activity of athletes and evaluate the actions of both opponents at once using video replays of combat fights, accurately record the technical and tactical actions used by the participants in the fight and their instant-remote characteristics. The results of a survey of the competitive activity of the strongest karatekas in the world make it possible to identify differences in the indicators of the volume of preparatory actions, their versatility, efficiency and success. It is noted that the leader of the world ranking has the highest volume of use of preparatory actions, which confirms their importance for the successful conduct of competitive struggle.

Keywords: *competitive activity, highly qualified karatekas, Olympic weight category up to 67 kg, characteristics of preparatory actions.*

Introduction. Analysis of the competitive activity of highly qualified athletes - leaders of world karate - made it possible to verify that the effectiveness of competitive fights (Japanese: SHIAI-KUMITE 試合組手) largely depends on the following factors:

- the athlete's ability to use preparatory actions;
- precise selection of the distance and moment of the start of the attack;
- the presence or absence of uncontrolled spontaneous pre-signals before the start of the chosen action, which can inform the opponent about the athlete's intentions.

All these factors sufficiently ensure the effectiveness of attackers and the effectiveness of defensive actions in competitive fights, and preparatory actions play the most important role among the means of tactical equipment of karatekas. Currently, there are no exact criteria for assessing preparatory actions; there is practically no information about the relationships between their use and their significance in the success of competitive activity in sports karate.

Objective of the study was to determine the versatility, effectiveness and success of preparatory actions used in competitive fights by highly qualified ka-

ratekas for the successful implementation of offensive and defensive actions.

Methods and structure of the study. Pedagogical supervision was carried out over highly qualified athletes occupying leading positions in the world rankings in the weight category up to 67 kg: Assadilov Darkhan (Kazakhstan), Dacosta Steven (France), Crescenzo Angelo (Italy), El-Sawy Ali (Egypt), as well as the leader of the Russian national team in this competitive discipline, Honored Master of Sports of Russia Evgeniy Plakhutin. The examination included competitive fights at the 2020 Olympic Games, World and Continental Championships, where these athletes achieved high results.

Results of the study and discussion. Combat action (Japanese SENTO KODO 戦闘行動) in karate is the main unit of combat activity of a karateka, which is a set of technical techniques that have preparatory, attacking, defensive, defensive-response motor structures. In sports karate, the concept of "combat actions" implies specialized movements of athletes that are used with the tactical intention of ending a combat fight with an effective striking technique when implementing selected actions of attack and defense.

Among the fighting actions in karate, the following should be distinguished: attacking, defensive, defensive-response. As a rule, a combat fight consists of a whole combination of actions (for example, initial attack - defense - retaliatory attack, etc.). At the same time, the implementation of combat operations cannot be ensured without serious preparation of the moment-to-remote conditions for their use, which determines the importance of preparatory actions for effective competitive confrontation.

Preparatory actions (Japanese: JUMBI DOSA 準備動作) – a group of tactical actions, usually preceding attacking, and sometimes defensive and defensive-response actions, which are carried out in order to ensure their effective implementation. Preparatory actions (PA) make it possible to provide conditions for the implementation of a selected technical technique and the completion of a combat fight with an effective striking action with a hand or foot [1, 3].

In sports karate, preparatory actions allow you to solve the following tactical problems:

- scout out the opponent's intentions (reconnaissance in force);
- disguise one's own intentions (camouflage);
- challenge the opponent to use offensive or defensive actions (challenge);
- prevent the opponent from starting the chosen combat action (interference).

To achieve the stated goal of the study, criteria for assessing the preparatory actions constantly used by highly qualified athletes in competitive fights at official international competitions held by the World Karate Federation (WKF) were determined.

Characteristics of preparatory actions:

- *volume of preparatory actions* - an indicator of the total number of preparatory actions used in a duel (competition);
- *versatility of preparatory actions* - an indicator of the use of various preparatory actions in a duel (competition);
- *the effectiveness of preparatory actions* - an indicator of the use of the total number of preparatory actions in a duel (competition) in relation to the number of its preparatory actions that caused the planned response of the opponent;

Indicators of the use of preparatory actions in fights of highly qualified karatekas in the weight category up to 67 kg

No.	Name	A country	Number of battles	Characteristics of preparatory actions			
				Overall volume ($\bar{X}$)	Versatility (%)	Efficiency (%)	Success (%)
1	Assadilov Darkhan	KAZ	9	31,7	45	32	10
2	Dacosta Steven	FRA	4	21,4	45	28	15
3	Crescenzo Angelo	ITA	6	18,9	50	41	13
4	El-Sawy Ali	EGY	3	23,2	45	36	16
5	Plakhutin Eugene	RUS	2	25,0	60	24	7
Statistical indicators		±σ	2,8	24,04	49	32,2	12,2
		$\bar{X}$	2,59	4,84	6,52	6,65	3,70

Note: No. – number in the WKF Olympic ranking, number of fights – number of examined fights.

- *the success of preparatory actions* - an indicator of the use of the number of preparatory actions that created the conditions for the effective use of subsequent attacking actions that received a judicial assessment, in relation to the total number of preparatory actions.

To obtain objective information, pedagogical observations were used using video recording tools, which allow conducting research without interfering in the competitive activity of athletes. Examination of the competitive activity (CA) of karatekas using video recordings makes it possible to evaluate the actions of both opponents at once using video replays of combat bouts, to accurately record the technical and tactical actions used by the participants in the fight and their moment-distance characteristics [2, 3].

The assessment of the performance indicators of competitive fights was aimed at identifying the characteristics of preparatory actions preceding the implementation of intentions in competitive fights among highly qualified karatekas of the Olympic weight category up to 67 kg, which made it possible to evaluate the versatility, efficiency and success of their use.

In the weight category up to 67 kg, the competitive activity of four athletes occupying the first four places in the international ranking was examined to compare their performance with the leader of the Russian national team in this competitive discipline, Tracked Master of Sports of Russia Evgeniy Plahutin (see table).

The Competitive Activity Survey (CAS) of Assadilova D. (at the time of the study No. 1 in the WKF Olympic ranking), carried out in nine fights at the 2020 Olympic Games, Asian and World Championships, allowed us to determine the highest indicator of the volume of preparatory actions (31.7), in comparison with other athletes. Considering that a Kazakh karateka fights using a defensive model of combat, one should pay attention to the average indicators of versatility (45%) and efficiency (32%) of preparatory actions [4]. The success rate of their use was only 10%.

The CAS of the French karateka Dacosta Steven (at the time of the study No. 2 in the WKF Olympic ranking), carried out on fourteen fights at the 2020 Olympic Games, World and European Championships, allowed us to establish an insufficiently high indicator of the volume of use of preparatory actions (21, 4). The athlete's inclination towards an offensive model of combat and the choice of active maneuvering explains their not very high efficiency (28%) and average level of versatility (45%). At the same time, the success of preparatory actions was found at a 15 percent level.

The CAS of the Italian karateka Crescenzo Angelo (at the time of the study No. 3 in the WKF Olympic ranking), performed over sixteen fights at the World and European Championships, made it possible to verify that he, like the French athlete, prefers to fight fights, choosing an offensive model and using active maneuvering. There is an insufficiently high volume of use of preparatory actions (18.9), which apparently explains the high, compared to other observed athletes, indicators of versatility (50%) and efficiency (41%). The success rate of preparatory actions was 13%.

The CAS of the Egyptian karateka El-Sawy Ali (at the time of the study No. 4 in the WKF Olympic ranking), performed on thirteen fights at the 2020 Olympic Games, World and African Championships, made it possible to identify the athlete's tendency to choose a defensive model of combat against the background of positional maneuvering. The total volume of use of preparatory actions was recorded at an average level (23.2). The versatility indicator is set at approximately the same level as that of previous athletes (45%). However, this karateka's efficiency and success rates turned out to be the highest (36% and 16%, respectively).

The CAS of the strongest Russian karateka E. Plakhutin in this weight category (at the time of the study No. 15 in the WKF Olympic ranking), performed over twelve fights at the World and European Championships, revealed the athlete's preferences mainly for choosing a defensive model of combat using positional maneuvering. The total volume of preparatory actions was 25. Against the background of a fairly high versatility of preparatory actions (60%), the athlete showed low efficiency (24%) and success (7%).

Conclusions. The results of a survey of the competitive activity of the strongest karatekas in the world, performing in the Olympic weight category up to 67 kg, make it possible to identify differences in the indicators of the volume of preparatory actions, their versatility, efficiency and success. It should be noted that the leader of the world ranking recorded the highest volume of use of preparatory actions, which confirms their importance for the successful conduct of competitive struggle. Against the background of a sufficient versatility of preparatory actions, a good level of their effectiveness was found. The conducted examination of the competitive activity of the leaders of the world ranking and the strongest Russian karateka allows us to conclude that the choice by athletes of the types of preparatory actions and their correlation is explained by the individual inclinations of the athletes, as well as the influence of mental and intellectual factors, which is reflected in the preparation and implementation of

technical and tactical actions, on the effectiveness of competitive activity.

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Psychological features of motivation of athletes in the aspect of theoretical analysis

UDC 159.9

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Abstract

Objective of the study was to identify scientific aspects of considering the phenomenon of sports motivation as a psychological feature of athletes.

Methods and structure of the study. Theoretical research methods were used: comparative typological (of great importance when analyzing literature on a research problem), method of generalization and systematization (generalization of concepts and definitions, establishment of general properties and characteristics based on scientific research in working with sources).

Results and conclusions. The role of motivation in psychological science is defined, historical aspects of the study of motivation are described, and features of the manifestation of sports motivation are identified. The concept of personality in psychology is also defined, the specifics of the mental state of an athlete's personality in the process of forming sports motivation are revealed.

The findings reflect the key role of motivation in shaping attitudes towards sport, particularly during the formative years, highlighting the need for a meaningful approach to motivation research. This approach focuses on the significant influence of the social environment, nurturing strong self-esteem and realistically shaping athletes' aspirations, which ultimately improves mental toughness, determination and overall commitment.

Keywords: *sports motivation, sports activity, athlete's personality.*

Introduction. This work contributes to the understanding and identification of the characteristics of sports motivation and offers possible solutions for creating effective implementation of sports activities. Research on athletic motivation is important for several key reasons. The first of these is increased productivity. Understanding the intricacies of sports motivation can enhance the ability of athletes and coaches to optimize performance. By identifying the factors that motivate athletes, coaches can tailor training, personal development, and strategies to better suit individual needs, resulting in improved athlete performance.

It is important to recognize the impact of motivation on an athlete's mental state, self-confidence and overall well-being. By uncovering these characteristics, coaches and athletes can work to create a positive, empowering environment.

People respond differently to different motivating factors. Coaches, armed with a deep understanding of sports motivation, can tailor their coaching styles and techniques to meet different motivational needs. This promotes more effective communication and understanding between coaches and athletes.

By understanding the nuances of sports motivation, coaches and athletes can engage in strategic planning, goal setting, and performance measurement. This, in turn, can lead to continuous improvement and sustainable success in the sports arena.

Objective of the study was to identify scientific aspects of considering the phenomenon of sports motivation as a psychological feature of athletes.

Methods and structure of the study. Theoretical research methods were used: comparative typological (of great importance when analyzing literature on a research problem), method of generalization and

systematization (generalization of concepts and definitions, establishment of general properties and characteristics based on scientific research in working with sources).

Results of the study and discussion. First, let's look at the existing definitions of motivation in psychological science. E.P. Ilyin [3] notes that motivation controls human behavior. The most important aspect of motivational psychology is the assessment of the overall orientation of the individual, with an emphasis on either achieving success or preventing failure. It is widely believed that in the inherently competitive field of sports, the desire to achieve success must prevail. Thus, in the work of S.N. Loseva [4] identifies spirituality as a motivational component of giftedness. And this approach is confirmed by the importance of spiritual improvement for the development of personal qualities and volitional efforts in achieving the intended goal.

Research on the motivation of athletes to achieve success highlights the significant impact of well-structured education and training in promoting this motivational drive and reducing the tendency to avoid failure [5].

Despite the fact that researchers do not distinguish sports motivation separately, motivation in sports is considered as one of the main driving forces of an athlete. In general, research on motivation for success among people involved in sports indicates a higher level compared to those who do not participate in sports, and, in addition, this type of motivation can be effectively cultivated using special tools and techniques.

Thus, motivation as a fundamental psychophysiological process in human behavior includes a rich set of factors that control behavior, decision making and the degree of motivation itself. Hierarchy of needs theory outlines the structure of human needs, emphasizing that satisfaction of lower-level needs forms the basis for influencing higher-level needs. In addition, social motivation is identified as an affective system that influences individuals' efforts to navigate their social environment and maintain a balance between intrinsic and extrinsic motivational orientations.

As these ideas develop, it becomes clear that by understanding the intricacies of human motivational dynamics and needs, psychologists gain a deeper understanding of the complex interplay of factors that shape human behavior and decision-making. Hierarchy of needs theory and the social motivational approach shed light not only on the hierarchical nature of human needs and drives, but also on the flexible and dynamic interaction between affective and cognitive processes in motivation.

Speaking about motivation in the field of sports activities, G.B. Gorskaya, I.I. Tsaregorodtsev and S.V. Ilyinsky [8] note that motives for playing sports manifest themselves in both direct and indirect forms, intertwined with personal and social expectations. Initially, people begin their journey in sports, driven by personal motives, but as they develop, many factors begin to shape their motivational structure.

Throughout this process, the awareness and overcoming of personal needs in favor of what is necessary increases. Moreover, the predominance of perfectionism in sports expectations, formulated by Yu.Yu. Chernyavskaya [10], emphasizes that the sphere of sports achievements helps in building ambitions, and therefore motivates to a sufficient extent. In the work of E.I. Berilova [1] notes the significant role of social expectations as integral components that form the motivational basis of athletes' behavior, leaving an indelible imprint on their attitudes and approach to future sporting achievements.

M.N. Firsov [9] assessed the psychological situation in training groups of athletes and made the following conclusions. In the structure of sports motivation, athletes in groups with a predominant permanent composition primarily demonstrate "achievement motivation," while athletes in groups with different contingents demonstrate a predominant "external motivation." In addition, the lowest scores in both groups relate to "self-development motivation" and "communicative motivation."

Thus, sports motivation within the framework of psychological science is a complex and constantly evolving phenomenon. The structure of sports motivation covers the interaction of internal and external factors, achievement motivation, competitiveness, social dynamics, psychological needs and desire for goals. Understanding this structural foundation is essential for coaches, sport psychologists, and athletes themselves, as it lays the foundation for maintaining sustained motivation, enhancing performance, and creating a positive, growth-oriented sports environment.

The structure of sports motivation includes the motive for achieving success, the motive for avoiding failure and the motive for the situation. This concept provides a comprehensive understanding of the intrinsic and extrinsic components that shape an individual's

motivation in the context of sport and performance. In general, understanding the structure of sports motivation in accordance with the concept of M.N. Firsov [9] is necessary to promote personal growth, optimize sports performance and develop motivational strategies, all of which contribute to more fulfilling and successful sports activities.

In empirical studies of the psychological characteristics of sports motivation, there is evidence that there are no changes in the dynamics of sports motivation by age groups, which indicates the absence of a significant correlation between the formation of sports motives and the process of growing up of respondents [7]. One of the studies [2] shows that in early adolescence, motivation does not show clear differentiation: both internal and external motives make a significant contribution to the formation of a positive worldview and the reduction of negative attitudes in the course of activity. However, in late adolescence, the number of relationships decreases, which reflects the restructuring of motives and the absence of dominant motivational regulators in the formation of dispositional optimism.

Conclusions. The study of motivation spans multiple perspectives and fields of study, revealing the multifaceted nature of human motivation. In this field, scholars have identified a social-motivational approach that distinguishes feedback motivation from action motivation, which represents a fundamental theoretical advantage. Research also emphasizes the importance of spirituality as a motivational component of giftedness that goes beyond traditional pragmatic motivation, noting the importance of qualities necessary for spiritual growth, such as focus, determination, and willpower.

Historical aspects of motivation research are described. Three main directions are identified: substantive theories of motivation, procedural theories of motivation and theories based on specific models of researchers. Features of the manifestation of sports motivation are revealed. Despite the fact that researchers do not distinguish sports motivation separately, motivation in sports is considered as one of the main driving forces of an athlete. In general, research on motivation for success among people involved in sports indicates a higher level compared to those who do not participate in sports, and, in addition, this type of motivation can be effectively cultivated using special tools and techniques. The findings highlight the key role of motivation in shaping attitudes towards sport, especially during the formative years.

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Stress resistance as a way to extend active longevity

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Abstract

Objective of the study was to study students' awareness of stress resistance and ways to increase it in the context of prolonging active longevity.

Methods and structure of the study. During the study, a survey was conducted (N=106), participants of the X Olympiad of students in the specialty "Physical Culture and Sports", as well as students from Yekaterinburg studying in the field of "Physical Culture". The questionnaire, along with general information about students, contained questions whose purpose was to identify the respondents' attitude to stress resistance as a factor in prolonging active and healthy longevity.

Results and conclusions. Using a survey, students' attitudes toward stress resistance as a predictor of active longevity were assessed. It was found that the most important components of maintaining a stress-resistant state, according to respondents, are: healthy sleep, physical activity and positive thinking. Factors that least reflect stress resistance are: meditation, changing the type of activity and breathing exercises.

Most respondents daily use in their lives ways to achieve active longevity that directly affect increased stress resistance, such as physical activity, positive thinking, and socialization. Factors that negatively affect the stress resistance of respondents in everyday life are: problems in professional sports activities, unhealthy sleep, negative thinking, problems in the family.

Keywords: *stress resistance, active longevity, students, athletes, stress factors, health.*

Introduction. In the modern world, stress has become an integral part of everyday life, and this poses a serious problem for society, since prolonged exposure to stressful situations can lead to the development of serious diseases and a reduction in active longevity. Stress resistance is a person's ability to effectively cope with negative environmental influences and maintain psychological and physical health. The experience of Russian scientists in the field of gerontology and geriatrics suggests that aging is a process of age-dependent decrease in the functional capabilities of the body, the ability to withstand environmental changes and stress [1, 3]. Russian scientists call one of the main determinants of active longevity the ability to withstand stress [2, 4]. As the experience of foreign experts shows, high stress resistance, which manifests itself in emotional stability and high activity, is associated with a longer life expectancy. This is confirmed by studies by Antonio Terracciano and Corinna E L ckenhoff [7] from the US National Institute on Aging. Foreign authors suggest that stress resistance plays a key role in prolonging active longevity [6]. Thus, it has already been scientifically proven that there is a relationship between stress resistance and active longevity. These studies demonstrate the significant role of stress resistance in overall health and life expectancy, which confirms the relevance of research in this area.

Objective of the study was to study students' awareness of stress resistance and ways to increase it in the context of prolonging active longevity.

Methods and structure of the study. Using a survey, students' attitudes toward stress resistance as a predictor of active longevity were assessed. A survey

was conducted in which 106 students (age range from 17 to 39 years) took part. The respondents were participants of the Xth Student Olympiad in the specialty "Physical Culture and Sports", as well as students from Yekaterinburg studying in the field of "Physical Culture". The survey was conducted via Google form and included 2 parts. The first part of the survey contained general information about the respondents: age, gender, type of sport. The second part of the survey included questions whose purpose was to identify respondents' attitudes toward stress resistance as a factor in prolonging active and healthy longevity.

Results of the study and discussion. Assessing the respondents' opinion about stress resistance in the context of achieving an active and healthy longevity, it was revealed that the most important components of maintaining a stress-resistant state are: healthy sleep (76.4%), physical activity (71.7%) and positive thinking (69.8%). Factors that least reflect stress resistance, according to respondents, are: meditation (29.2%), change of activity (23.6%), breathing exercises (18.9%). In our opinion, these results were obtained due to the fact that the majority of respondents go in for sports on a regular basis (94.3%). As you know, healthy sleep and physical activity are an integral part of an athlete's life. In turn, positive thinking is a consequence of physical activity, which is confirmed by a study by the US National Institute on Aging on the relationship between physical activity on a person's thoughts and, consequently, on life expectancy (people with emotional stability and positive thinking lived on average 2-3 years longer) [5]. According to respondents, the students chose breathing exercises as the least significant factor influencing stress resistance. We attribute this to the fact that students do not know, and therefore do not master, breathing exercises techniques. In our opinion, the potential of this factor is underestimated in the context of achieving stress resistance.

Based on the results of the study, it is clear that the majority of respondents daily use in their lives the following ways to achieve active longevity, which directly affect the increase in stress resistance: physical activity (48.8%), positive thinking (43.5%), socialization (43.5%). Less popular methods among daily use are: control of the emotional state of the body (9.5%), breathing exercises (4.2%), meditation (2.1%). The least frequently used (once a week) methods of achieving active longevity by respondents are: restorative procedures (25.4%), changing the type of

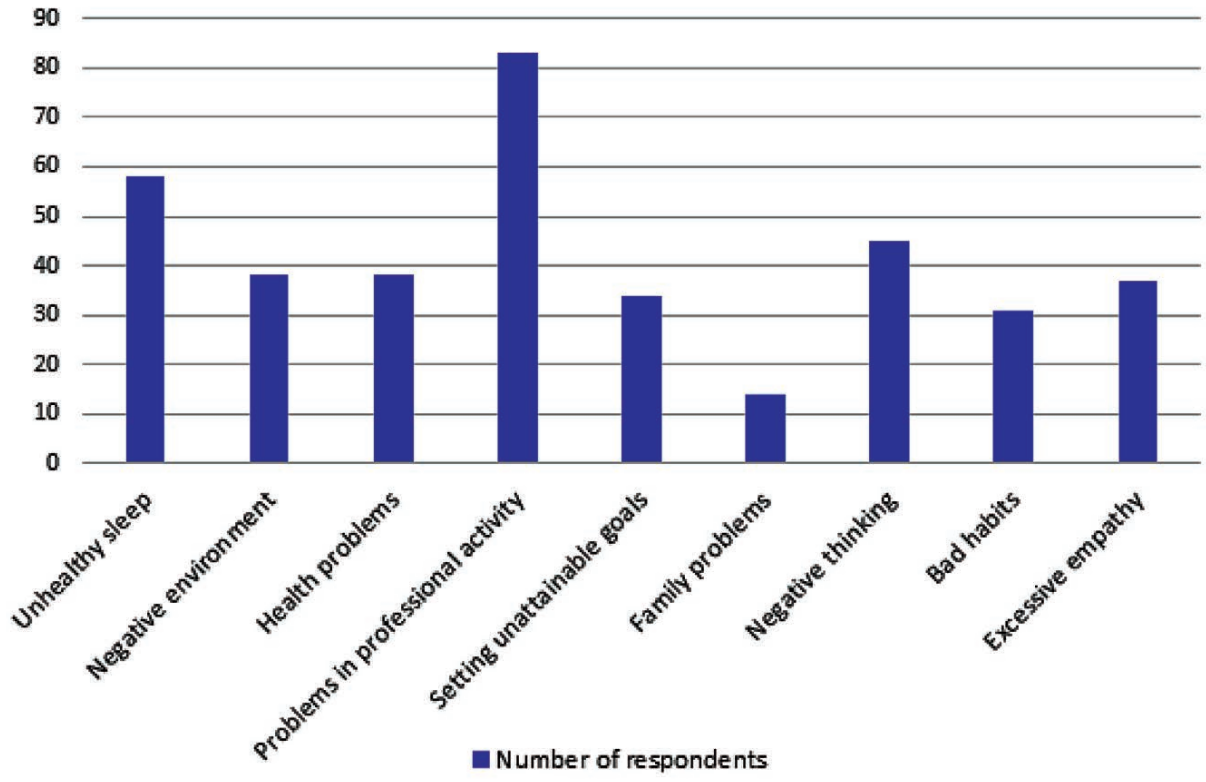

Figure 1. Respondents' opinions about factors that negatively affect stress resistance in their daily lives

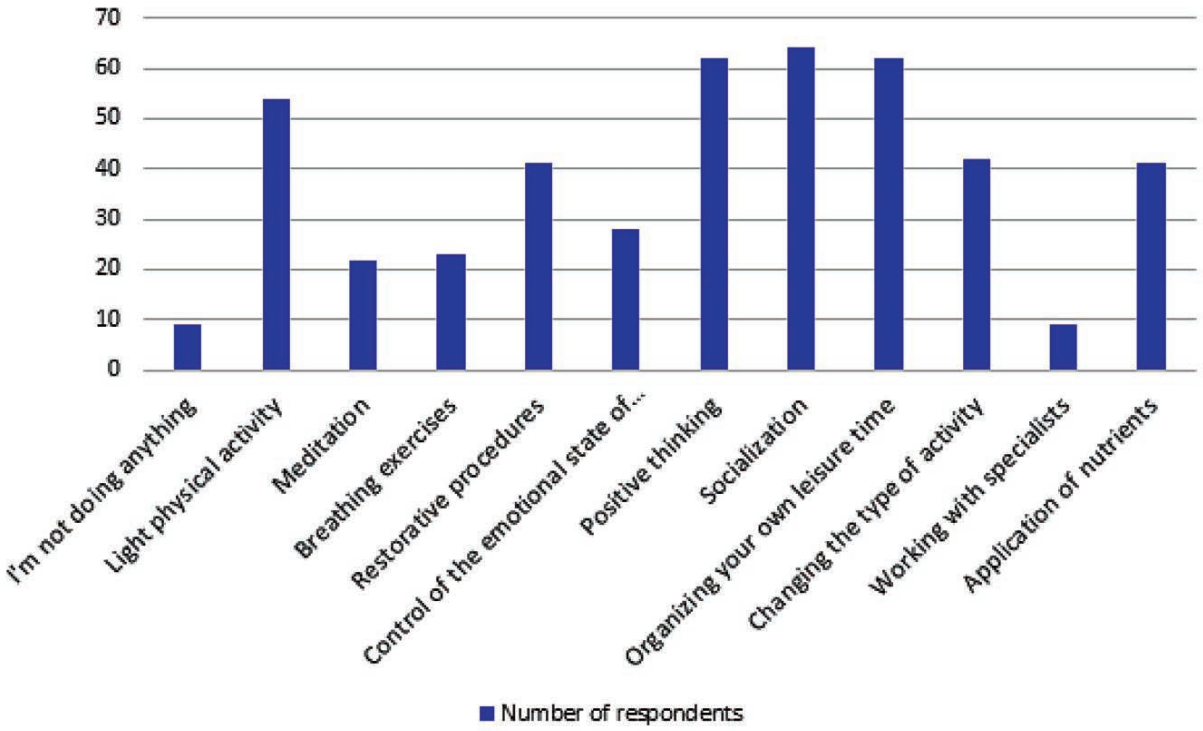

Figure 2. Methods used by respondents to increase their level of stress resistance and reduce the impact of negative factors on health and life expectancy

activity (25.4%), breathing exercises (15.9%), meditation (14.8%). Ways to achieve active longevity that respondents noted as not used in their daily lives are: meditation (58.3%), breathing exercises (54.1%), control of the emotional state of the body (44.5%). These results indicate that athletes do not fully use means to increase stress resistance and, accordingly, there is a point of growth in extending healthy and active longevity.

The main question for students was formulated in the following form: "Name the factors that prevent you from being stress-resistant in everyday life." The selection of answers varied; as a rule, several answer options were selected. Among the options were the following: unhealthy/insufficient sleep, negative environment, health problems, problems in professional activities (the majority of respondents were active athletes, professional activities are understood as sporting achievements), family problems, negative (pessimistic) thinking, bad habits, excessive empathy. In the "other" tab, respondents noted setting unattainable goals. The results of answers to this question are shown in Fig. 1.

From Figure 1 it can be seen that the most common negative factors influencing stress resistance of respondents in their daily lives are: problems in professional activities (88%), unhealthy sleep (61.5%), negative thinking (47.7%). The least common factors are family problems (14.8%). In our opinion, this is due to the fact that the majority of respondents are 1st-2nd year students who rarely have contact with their families.

The following graph reflects ways that will contribute to achieving active longevity by increasing stress resistance (Fig. 2).

Figure 2 shows that the most frequently used methods to increase the level of stress resistance and reduce the impact of negative factors on health and life expectancy, respondents noted socialization (67.8%), positive thinking (65.7%) and organizing their own leisure time (65.7 %). The least frequently used methods were breathing exercises (24.4%), meditation (23.3%) and working with specialists (9.5%). It was also revealed that 9 out of 106 respondents (9.5%) do not take any action to increase the level of stress resistance and reduce the impact of negative factors on health and life expectancy.

Conclusions. Thus, the study identified factors that both negatively affect stress resistance in everyday life and contribute to its increase. The identified factors make it possible to maintain stress resistance

and create additional opportunities for prolonging active and healthy longevity.

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Digital image of sports mega-events in the media and social networks

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Abstract

Objective of the study was to analyze the "digital trail" of the International University Sports Festival in Yekaterinburg to determine the factors that form a positive image of future sports mega-events.

Methods and structure of the study. During the study, mass interviews of volunteer candidates and content analysis of publications of materials about the Festival in the media and on social networks were carried out. Basic indicators of interviewing: experience and resources for participation in volunteer projects, amount of knowledge about sports mega-events, motivation for participation. Basic indicators of content analysis: number of publications about the Festival, level of publications, tone of publications.

Results and conclusions. The effectiveness of a sports mega-event as a soft power largely depends on its presentation in the digital space. When assessing the digital image of a sporting mega-event, the problem is often that the positive tone of official government and official media assessments does not always match the tone of assessments given by non-state media and citizens on social networks. Along with the optimal number of official messages, the "tone" of the individual publications of the organizing participants is of great importance. One of the important transmitters of a positive image are sports volunteers.

Keywords: *sports mega-events, new media, digital image, volunteers.*

Introduction. Sports mega-events are, first of all, "media events"; it is the prevalence of information about them in the media and social networks that makes them "mega".

In the 1990s, the philosopher and sociologist P. Bourdieu presented the Olympic Games, on the one hand, as a physical "giant sports spectacle" in which athletes from all over the world participate and compete, and on the other hand, as a "television show" broadcast throughout the world. to the world. And this image, "an ensemble of representations of the first performance" [6, p. 79], created by one of the traditional media, differs from reality.

In the digital society that has developed in our time, "the history of the Olympic movement, as a world-cultural event, also reflects the evolution of information technology" [3, p. 88]. Since the mid-1990s, the relationship between the Olympic Games and the media has continued to be transformed by digital technology, and this has also affected other sporting mega-events. Their planning, production and consumption are becoming increasingly digital [7, p. 618], they are no longer perceived exclusively through television or visiting stadiums, their image is largely shaped by new media.

The International University Sports Festival (hereinafter referred to as the Festival), which took place in August 2023 in Yekaterinburg, received the status of a sports mega-event in the assessment of official authorities and the media [1, 2, 4]. Whether this status will be consolidated in the works of researchers remains to be assessed; some believe that only stable and repeating sporting events can be classified as mega-events. However, the analysis of the reflection of the Festival in interviews with volunteers and the media seems to us relevant for both the educational and sports communities.

Objective of the study was to analyze the "digital trail" of the Festival to determine the factors that form a positive image of future sports mega-events.

Methods and structure of the study. The research tasks included determining the image of the Festival in the mass consciousness of volunteers, identifying their socio-psychological positions, and the potential of the media in shaping the image during the Festival.

Object – technologies for forming a positive image of the International University Sports Festival.

Subject - factors of formation of a positive digital image - media, social networks, volunteer corps as an active actor in the event.

Basic methods. The sociological approach was chosen as the main theoretical platform. The empirical base is materials from a two-stage study. 1. Mass interviewing of Festival volunteer candidates (N=2701). Mathematical processing using Vortex.10 software. Basic interviewing indicators: experience and resources for participation in volunteer projects, the amount of knowledge about sports mega-events and the Festival, motivation for participation, socio-psychological characteristics, possible positions at the Festival. 2. Content analysis of publications of materials about the Festival in the media and on social networks. Basic indicators of content analysis: number of publications about the Festival by days, level of publication (regional, federal, international), tone of publications (positive, neutral, negative). The operator of the field stage is the UrFU volunteer center "Volunteers of the Urals".

Results of the study and discussion. The new digital media environment is more pluralistic, and "digitalization" itself, as researchers note, is an integral characteristic of social reality [5, p. 267]. In the modern socio-cultural space, sports mega-events are capable of influencing the economic and social development of territories more strongly than in previous periods, positively influencing social processes at various levels - from local to global, acting as "soft power".

State and municipal authorities, large corporations, as well as large developers and representatives of the hospitality industry are primarily interested in holding mega-events. Higher educational institutions also see certain benefits from holding mega sports events in Russia.

But when assessing the digital image of a sports mega-event, the problem often lies in the fact that the positive tone of official assessments by the government and a narrow group of political and business elites does not always coincide with the tone of assessments given by non-state media and residents themselves on social networks.

Of particular importance are technologies for forming a positive image of a sporting event, methods of suppressing negative information in conditions of information confrontation and ideological inconsistency of various social systems. The image of a sporting event is formed on the basis of both subjective and objective factors. Initially, the image is formed spontaneously on the basis of subjective impressions, develops as an emotional construct of individual perception, then is supplemented by the rational component of managing communications of the sporting event and social institutions participating in the event, but the final image is constructed on the basis of the synergistic effect of the combined perceptions of the participants of the mega-event and reflection in the media.

Volunteers are important transmitters of the positive image of sporting events. The operator of the Festival's volunteer program was the Ural Volunteers Center of the Ural Federal University. Based on the program for selecting volunteers, he carried out the function of promoting the Festival among the youth of Yekaterinburg and attracting university and college students to participate in the volunteer program of the Festival. The selection of volunteers was carried out from March 16 to August 10, 2023.

Table 1. Volunteer recruitment statistics

Informing	01.06.2023	01.07.2023	01.08.2023
Applications received	1103	1700	4751
Interview conducted	454	1155	3411
Opting out	152	247	967
Waiver based on age	46	139	373

It can be noted that during the application campaign it was possible to obtain the required minimum for the formation of a volunteer corps only in the last month. Competitive selection and compliance with the deadlines for the implementation of the volunteer program were hampered by the lack of interaction between the Festival organizing committee and executive authorities, public organizations and volunteer associations to inform the target group about the selection process.

The dynamics of selection can be judged from the data in Table 1.

During the selection process, candidates underwent an interview, during which their level of awareness about the Festival was assessed: types of sports and the facility, knowledge of the place and timing of its holding, as well as their attitude towards the Festival and the motivation of future volunteers. In general, respondents positioned the Festival as a large-scale sporting event for Yekaterinburg, Russia as a whole and friendly countries, calling it "student games", "the former Universiade" and a significant event for themselves personally.

Excerpts from typical interviews explaining the motivation of volunteer candidates:

"This will be my first international event, the Festival is a large multi-sports event in 14 sports at 6 sports facilities for students from 17 to 25 years old" (young man, 24 years old, St. Petersburg);

"It's interesting to take part, to meet volunteers from other regions, this is a major international event, in which university students from the SCO, BRICS, and CIS countries will participate, and is the starting point for many athletes" (young man, 21 years old, Novosibirsk);

"Participation in the Festival will allow you to develop communication skills and interaction with foreigners, the event itself will be held in August, during the 300th anniversary of Yekaterinburg, 14 sports will be presented" (girl, 19 years old, Yekaterinburg);

"I have been involved in sports since childhood, it will be interesting to see how major sports competitions are held, the event will include competitions in swimming, volleyball, athletics, the Universiade Village, EXPO center, Aquatic Sports Palace will be involved" (girl, 28 years old, Nizhny Tagil).

Motivation was measured as an integrated indicator on a scale of 0 (min) – 3 (max), which, in addition to awareness of the event, included an indicator of a clear understanding of the applicant's role in the volunteer program and willingness to participate in it for free. A score of 3 was given by interviewers in 55% of cases, 2 – 36%, 1 – 8%, 0 – less than 1%.

We also analyzed the quantity and quality (tone) of publications about the Festival in international, federal and regional media. The results of the analysis are presented below (Tables 2, 3).

The peak of activity, as expected, was immediately before and during the Festival; the maximum publications at this time were of a regional nature, for the en-

Table 2. Distribution of publications about the Festival by level (regional, federal, international)

Publication period	Level			Total
	Regional	Federal	International	
July 2023	535	1363	40	1938
August 2023	3947	3751	256	7954
Total	4482	5114	296	989

Table 3. Distribution of media publications about the Festival by tone of publications (positive, neutral, negative)

Publication period	Tonality			Total
	Positive	Neutral	Negative	
July 2023	119	1821	0	1938
August 2023	648	7297	7	7954
Total	765	9118	7	9892

tire period - federal. The predominant tonality is neutral.

Conclusions. The effectiveness of a sports mega-event as a soft power largely depends on its presentation in the digital space. When assessing the digital image of a sporting mega-event, the problem is often that the positive tone of official government and official media assessments does not always match the tone of assessments given by non-state media and citizens on social networks.

Along with the optimal number of official messages, the “tone” of the individual publications of the organizing participants is of great importance. One of the important transmitters of a positive image are sports volunteers.

In addition, it is necessary to take into account the so-called “spiral of silence” - opinions unspoken for various reasons, possibly negative. Identifying the causes of a negative impression involves monitoring using various qualitative techniques to determine the necessary factors in the preparation and conduct of sports mega-events.

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Formation of digital competence in the scientific research of a master student in professional education in the field of physical education and sports

UDC 37.032

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Abstract

Objective of the study was to identify and theoretically justify the use of methodological approaches in solving the problem of developing digital competence in the scientific research of a master's student in vocational education and management in the field of physical culture and sports.

Methods and structure of the study. An analysis of the scientific literature related to the research topic was carried out [1, 3, 4, 5].

Results and conclusions. In solving the problem of developing digital competence in a scientific study of a master's student in vocational education and management in the field of physical culture and sports, the use of such methodological approaches as problem-oriented and active learning, competency-based, systemic, personality-oriented, integrative, and activity-based is proposed.

It is noted that the methodological approaches under consideration make it possible to expand the content of the research activities of a master's student in the field of vocational education and management in the field of physical culture and sports, which helps to increase his independent creative activity; development of skills in searching and analyzing a large amount of information, the ability to apply various methods of objective assessment of one's work, as well as the formation of other professional competencies and personal qualities that meet the current needs of modern practice.

Keywords: *methodological approaches, integration, digital competence in the scientific research of a master's student in professional education and management in the field of physical culture and sports.*

Introduction. The sociocultural situation that has developed in modern Russia has not only brought about profound changes in various spheres of public life, but also contributed to global updates in the education system. One of the updates is the so-called integrative nature of education, aimed at consolidating various branches of scientific knowledge, including in the field of humanities, in a single educational space accumulating sciences and scientific disciplines based on their contiguity and complementarity. At the current stage of development of education, its integrative nature when studying the process of personality development in pedagogically oriented works requires turning to related subject areas of scientific knowledge.

Objective of the study was to identify and theoretically justify the use of methodological approaches in solving the problem of developing digital competence in the scientific research of a master's student in vocational education and management in the field of physical culture and sports.

Methods and structure of the study. An analysis of the scientific literature related to the research topic was carried out [1, 3, 4, 5].

Results of the study and discussion. The process of digitalization of university training for students, regardless of the level of higher education they receive (bachelor's, specialist's or master's), is given a very significant place in pedagogical science, as evidenced by many different approaches to the study of this problem [6].

One of the most important theoretical directions in the modern development of the educational space is student-oriented learning, based, among other things, on the digitalization of education, that is, on the introduction of the achievements of digital technologies into the educational process. Within the framework of a person-oriented approach, it becomes possible to structure psychological and pedagogical conditions, select algorithms, tools and methods for conducting research work (R&D) of a master's student specializing in professional education in the field of physical culture and sports, as well as analyze the results of R&D.

However, despite the fact that the effect of introducing digital technologies into the educational process is undeniably high and in terms of the personal development of students its importance cannot be overestimated, traditional education and its inherent methods and methodologies, created in other living conditions, played a positive role in their time. In the new conditions, declarative methods of presenting information, stating the nature of "knowledge" control, contribute to the formation of students' underestimation of the role of independent activity in the formation of the necessary competence.

A modern form of active learning in higher education, thanks to the introduction of which it becomes possible to overcome these inconsistencies, is contextual learning. It models a professional context, that is, it gives the student the opportunity to express himself in professional activities. A form of contextual learning can be a business game that models the subject world of a future specialist and implements the basic principles of joint interaction between players.

The most important component of the educational process is the problem-oriented approach, that is, immersing students in situations that require an immediate solution. The problem-based approach requires the student to concentrate his attention on the problem and the possibilities for solving it. The student is required to be able to formulate and analyze the problem, identify ways and means to eliminate it. The use of a problem-oriented approach is directly related to the formation of students' motivation to master professional knowledge, increasing personal self-esteem, and acquiring a sense of confidence in their knowledge.

Professor V.V. Grinshkun in his works focuses on the integrative approach, considering the main goal of integration to be the unification of disparate parts and functions into a single whole. According to the scientist, an integrative approach to the development of digitalization tools for higher education lies in their typification, the rejection of the excessive variety of such tools and methods that solve the same problems, but at the same time differ in their characteristics, as well as in reducing methodological, content, technological and interface differences in the functioning and application of these tools [2].

A systematic approach allows us to identify and argue the criteria for the evolution of digital competence in the scientific research of a master's student in teacher education, which in their complex determined the productivity of pedagogical and psychological technologies used in higher education. Along with this, based on a systematic approach, it is possible to identify the most significant connections that influence the strength and stability of the process of introducing innovative (developmental) technologies in higher education; to structure problematic situations of the formation of digital competence in the scientific research of a master's student in the field of professional education and management in the field of physical culture and sports.

Within the framework of the activity approach, special attention is paid to the study of the pedagogical and psychological conditions for the realization of scientific potential in educational and research activities using information and communication technologies (ICT), demonstrating the level of personal potential, the horizons of the undergraduate, and the possibilities of the digital educational environment; to identify the necessary methods and technologies used in the preparation of tasks for conducting educational and training sessions using ICT, which are aimed at mastering the fundamentals of scientific knowledge and methods of theoretical research; to identify a model for the formation of digital competence in the scientific research of a master's student in the field of professional education and management in the field of physical culture and sports.

In accordance with the competency-based approach, professionally significant qualities of future

specialists, which are formed in the process of undergraduate research activities, are correlated with the components of digital competence. The course we offer "Information technologies in science and education" ensures the formation of digital competence at the subject level, the course "Methodology of research activities using ICT" - at the supra-subject level.

Testing of identified productive ideas in the Yeletsk branch of the Russian New University and in the Yeletsk State University named after I.A. Bunin allowed us to develop the concept of forming digital competence in the scientific research of a master's student in the field of professional education and management in the field of physical culture and sports.

Conclusions. The methodological approaches under consideration make it possible to expand the content of the research activities of a master's student specializing in vocational education and management in the field of physical culture and sports, which helps to increase his independent creative activity, develop skills in searching and analyzing a large amount of information, the ability to apply various methods of objective assessment of his work, and as well as the formation of other professional competencies and personal qualities that meet the current needs of modern practice.

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Assessment of motor activity indicators of students of a special medical group

UDC UDC 796.015

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Abstract

Objective of the study was to identify the dynamics of daily physical activity of students of a special medical group (SMG), to consider possibilities for its optimization based on motivation and goal setting.

Methods and structure of the study. Quantitative and qualitative assessment of motor activity (MA) of SMG students was carried out based on an analysis of the results of a pedometer, heart rate (built-in function in a smart watch/phone) and a survey of methods of physical activity, subjective opinion about its sufficiency and well-being at the end of the day according to SAN data (questionnaire "Well-being, Activity, Mood"). The study involved 566 people, including 376 girls and 190 boys, all belonging to the third health group (A) from two regions of the Russian Federation, the average age at the time of the study was 18.2 years, the experiment lasted 16 months.

Results and conclusions. The results obtained indicate that the average values of physical activity indicators in steps per day among SMG students vary from 4500 to 9000 depending on the time of year. The highest results were recorded in July, the lowest in October-November. It was experimentally shown that the results of motor activity in steps in boys and girls do not differ significantly, however, from the 1st to the 3rd course they tend to decrease; in the 2nd and 3rd course the data are relatively stable. The average values in which positive dynamics of well-being, mood and activity were noted were the results in the first year from 6500 to 7200, in the second and third years from 6300 to 6800 steps per day.

Keywords: *motor activity, students of a special medical group, daily locomotion, motor activity in steps.*

Introduction. In accordance with the Strategy for the Development of Education in the Russian Federation and the Concept of Demographic Policy of the Russian Federation for the period until 2025, strengthening the health of student youth, the formation of a conscious attitude towards it and, most importantly, independence and initiative in this regard, have been chosen as one of the priority areas of education. Especially against this background, the task of health formation of students with health limitations stands out, according to their indicators of psychophysiological conditions, physical fitness; at the university, for physical education, they are assigned to a special medical group. Health disorders, on the one hand, impose on the teaching staff the need to search for innovative technologies that ensure the formation of the need for an active lifestyle, and on the other hand, they actualize the student's issues of self-preservation. According to N.A. Rybachuk, self-preservation is determined by the student's conscious activity aimed at maintaining his own moral, physical and psychological well-being and includes compliance with the rules of body culture, occupational hygiene and rest (alternating mental and motor activity), nutrition and behavior in general [6]. Physical activity, essentially, satisfies the requirements of self-preservation, self-preservation and can help improve all health indicators, but only if it is optimal for the student, and especially for those with health limitations.

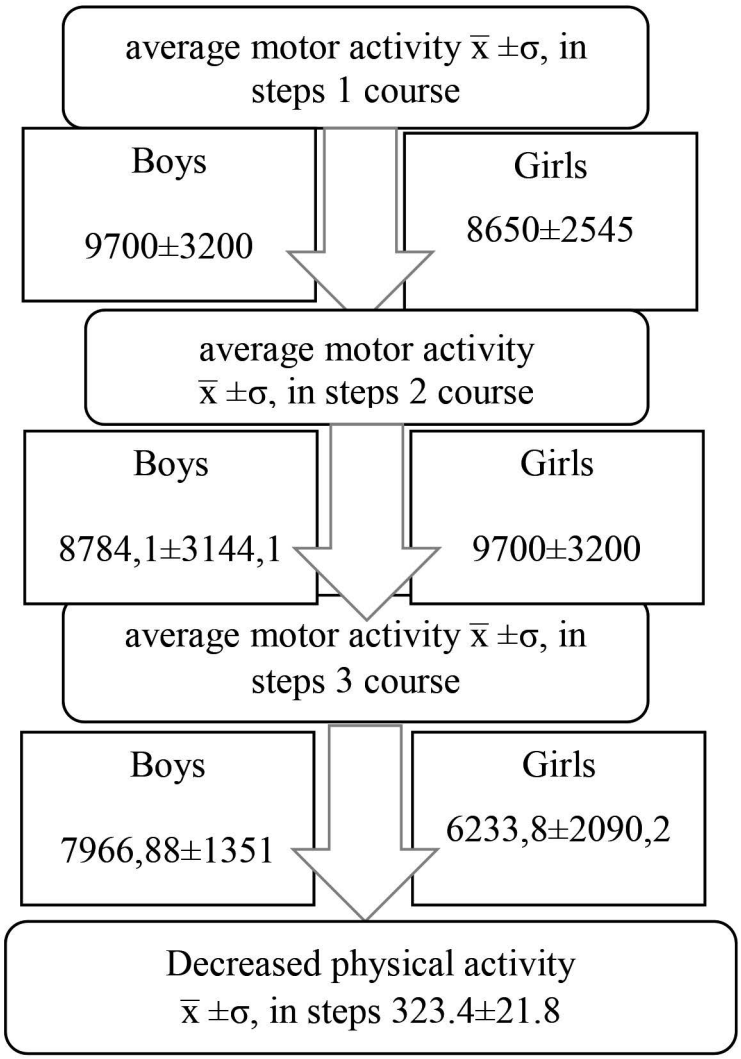
Objective of the study was to identify the dynamics of daily physical activity of students of a special medical group (SMG) and the possibilities for its optimization based on motivation and goal setting.

Methods and structure of the study. Quantitative and qualitative assessment of motor activity (MA) of SMG students was carried out based on an analysis of the results of a pedometer, heart rate (built-in function in a "smart watch"/phone) and a survey of methods of physical activity, subjective opinion about its sufficiency and well-being at the end of the day according to SAN. The study involved 566 people, including 376 girls and 190 boys, all belonging to the third health group (A) from two regions of the Russian Federation, the average age at the time of the study was 18.2 years, the experiment lasted 16 months.

Results of the study and discussion. Currently, the recommendation of 10,000 steps per day has become popular; it appeared in the 1960s in Japan, after the invention of the electronic pedometer. Inventor Yoshiro Hatano chose the name Manpo-kei for the device, which translated means "10,000 steps."

A scientific and methodological review of available foreign studies on this topic, published between 1980 and 2020, showed that normative data (expected values) in healthy young people (aged 18-29 years) are 70,00-13,000 steps per day. day. Specifically, Bohannon used a meta-analytic approach to summarize and present the number of steps per day taken by healthy adults (over 18 years of age), identifying 42 studies published between 1983 and 2004. Reported mean values for adults ranged from 5,400 steps per day and up to 18,000 in a sample of men whose average age was 34 years. Excluding the maximum single values in the sample, the author showed that the total average number of steps per day was 9,448 (8899-9996) [7].

Interesting studies, in our opinion, are presented by Tudor-Locke and Bassett, so the NHANES accelerometer data were interpreted and adjusted to facilitate understanding of the average values on the pedom-



Dynamics of motor activity from the first year to the third, in steps per day

eter; the authors proposed the concept of a graduated step index for healthy adults: from 5000 steps per day ("sedentary lifestyle") to ≥12,500 steps per day ("highly active"). This indicator was revised and received additional support in 2008 as part of an updated review of How Many Steps a Day Are Enough? [8].

Turning to the results of the study, we note that the physical activity of the studied population is at the level of a sedentary lifestyle, and there has also been a negative trend in its decline from the first to the third year (see figure).

As can be seen from the figure, the results we identified are below the recommended ones, this is consistent with the studies of domestic authors, which consider the norms of daily motor activity (DMA) for students from 10-14 thousand to 16-18 thousand locomotions per day [1,4].

It is worth noting that these indicators are recommended for healthy students, while the study population is students with persistent or temporary health problems, on the basis of which they are, in fact, enrolled in a special medical group (SMG). There is an opinion regarding students in this category that the normative for them is motor activity, amounting to 13-15 thousand locomotions on the days of planned physical education training sessions and 10-11 thousand locomotions on the days of their absence [5].

Thus, it turns out that the recommended values in the literature we studied and the data obtained in the study population differ, since the volume of physical activity was reduced almost by half.

At the same time, an attempt was made to study the psychophysiological reactions to the current volumes of DMA in students of a special medical group.

In the period from September 2022 to December 2023 (16 months), SMG students from 1st to 3rd year kept health diaries in which, among other things, they noted such indicators as: the number of daily locomotion in steps, average heart rate and took the SAN questionnaire once a month. Note that the data ($x \pm$) were obtained based on mathematical calculations of the normal distribution on the Gaussian scale.

During the analysis of the results obtained, it turned out that the most active months are May, July and August, so the maximum values of DMA of 20-23 thousand steps were recorded for 15.5% of students, the least active are November and March, the minimum results are 350-4570 steps for 13, 2%. It was noted that a surge in DMA is observed among first-year students in September, which is quite understandable (10-12 thousand locomotions in 87%), then active adaptation to the psychophysical stress associated with the beginning of training occurs and DMA indicators stabilize and reach average by the end of December values 2-3 courses.

Despite the importance of individual regulation and the search for optimal values of daily physical activity, the leading feature is age norms, which are considered as recommended from the standpoint of satisfying the biological (vital) need of the body for movement. Thus, the above-mentioned and scientifically based values of 10-15 thousand locomotions per day help improve health.

At the same time, as the study showed, the DMA of students by a special medical group is at a low, almost critical level, but comfortable judging by the results of the physiological reaction of the body and psycho-emotional state. During the study, a survey was conducted among the students participating in the experiment, asking them to answer the question: "why do you think your physical activity is low?" Various reasons were given, but in general they boil down to the following meanings: "not enough time" (49.2%); "no desire" (27.3%); "no company" (15.3%); "health difficulties" (8.2%).

A qualitative analysis of the survey results on the content of physical activity showed that in most answers it is defined by the word "walked", in the park, along the street, in second place in the frequency of answers among SMG students was "the road to the institute" and only in third place specifically organized physical activity: "jogging, active walking, skateboarding/skiing/rollerblading, etc."

VC. Balsevich noted in his scientific works that systematic physical activity, at a reasonably necessary and sufficient level, is possible only when its organization satisfies internal and external requirements. External motivation includes motivation for motor activity, aimed at developing, maintaining and improving one's own kinesiological potential; it is formed depending on the stimuli presented. To the internal ones - goal setting, as a conscious choice that the student makes on the basis of the available space of options, so that motor activity acts not only as a natural necessity of the body, but also as a socially determined need of the individual to maintain homeostasis, ensure morphological, functional and psychological well-being. Based on this, the implementation of genetic and sociocultural programs of human development in ontogenesis

consists of overcoming factors that hinder it: laziness, apathy, lack of company, etc. [2, 3].

At the same time, the content of physical activity, according to V.K. Balsevich should consist of his systematic motor activity in the form of the use of diverse physical exercises, which are based on purposeful motor actions.

Based on the above, we assume that the possibilities of optimizing the daily physical activity of SMG students can be realized if the following conditions are met: stimulating motivation for physical activity and encouraging goal-setting in matters of health formation as a personal, significant intention based on a conscious choice of means and methods of physical activity.

Conclusions. Indicators of daily physical activity (in steps) among students of a special medical group have a negative downward trend from the first to the third year, while they have a comfortable functional (in terms of the reaction of the cardiovascular system) and psycho-emotional state. It was noted that the quantitative results of the daily motor activity of boys and girls do not differ significantly, as well as its qualitative content, since it is of a primitive impulsive nature and serves rather to satisfy the natural need for movement and partly for communication. In our opinion, the issues of strict regulation of motor activity in steps remain debatable, and therefore there is an alternative to consider the possibilities of optimizing it based on the individual characteristics of the SMG student. In the course of studying the scientific literature, it turned out that daily physical activity can be optimized on the basis of persistent motivation for physical activity through awareness in defining goals and the possibility of developing an individual route to achieve them.

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Complex forms of education for students of a special medical group in the elective discipline «Physical culture and sports»

UDC 376.1; 378.147

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Abstract

Objective of the study was to determine the effectiveness of various forms of training in educational programs for students of a special medical group during practical classes in physical education.

Methods and structure of the study. 171 students of special medical group "A" took part in the experiment. A pedagogical experiment on the implementation of educational programs using electronic educational technologies was carried out on the basis of Altai State University in the period from 2018 to 2020.

Results and conclusions. Based on the results of the survey, the effectiveness of the educational program was proven, which included the traditional (contact work) form of education and the use of electronic educational technologies (electronic course), in order to increase awareness, interest and desire to increase one's physical activity and engage in physical education. The need to expand the educational program for students with health problems is outlined, expressed in the introduction of theoretical and educational materials that can be implemented through electronic educational technologies. Conclusion. The inclusion of the proposed classes in the curriculum of elective disciplines "Physical Culture and Sports" for students with health problems allows you to increase the quality of knowledge and skills necessary for the implementation of physical activity with individual consideration of diseases, as well as independently select physical exercises and their dosage for organizing independent exercises in order to stabilize existing health deviations, exercise self-control and psychomotor development, and increase motivation for exercise.

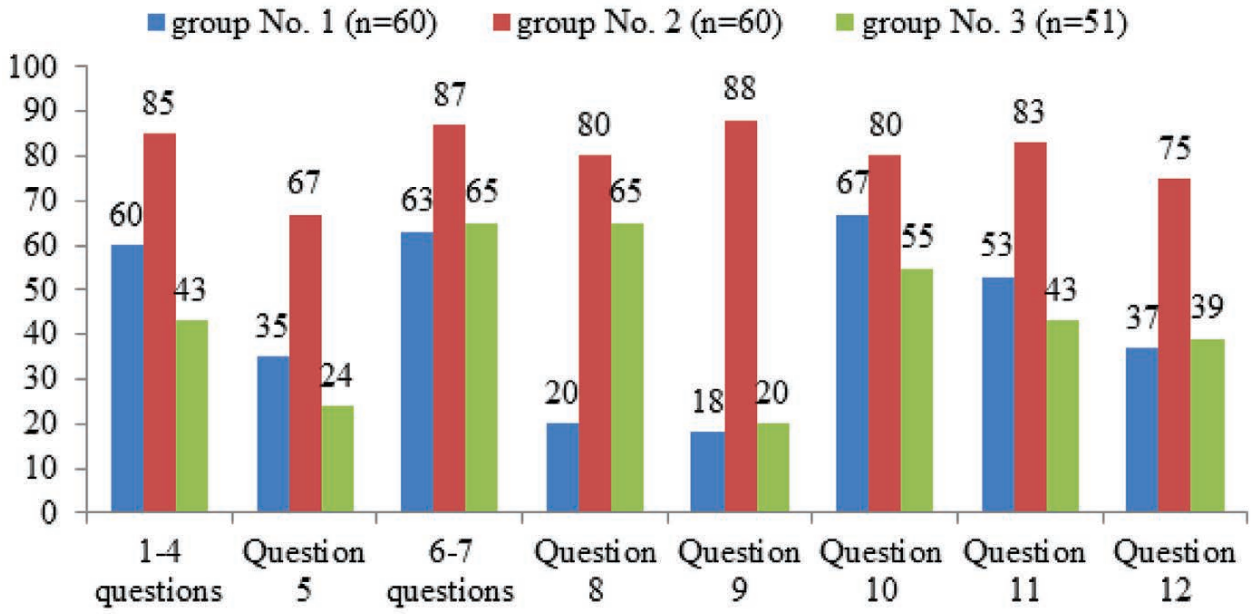
Keywords: *physical activity, special medical group, diseases, blended learning, efficiency, motivation.*

Introduction. There is sufficient evidence to make informed judgments about the beneficial effects of physical activity on the normalization and stabilization of physical health, as well as self-esteem, symptoms of anxiety, depression, stress tolerance [1, 5] and brain activity [6]. At the same time, students, as representatives of the younger generation, poorly understand and are not aware of the impact of systematic physical activity on a person's psychological health [4].

The majority of students with a history of diseases of varying severity, as a rule, did not engage in physical education while studying at school and were most often exempted from practical physical activity for various reasons [3]. Most of them do not understand what they can do with a diagnosis and how it will positively affect their health. Having entered the university, such students already have a formed belief that any physical activity is contraindicated for them.

Forming motivation for physical education and sports is possible with adapted training and increasing students' physical education in practical issues of application in everyday and professional activities [2, 7]. Students who participate in the practical assessment process in a purposeful and structured manner are more capable of learning and are more involved in the learning process, which in turn increases the value of the training process [8].

Objective of the study was to determine the effectiveness of various forms of training in educational



Positive answers in the survey of students of the special medical group (n=171), %

programs for students of a special medical group during practical classes in physical education.

Methods and structure of the study. The study was conducted from 2018 to 2020. After an annual medical examination of first-year students at Altai State University (Barnaul), three groups of students were formed, assigned for health reasons to a special medical group "A", with pronounced deviations in health (Table 1).

Students of groups 2 and 3 studied according to training programs developed by us using electronic educational technologies (electronic course).

The standard form of training included contact work in practical classes at the university's sports facilities and independent studies. The program included the following sections: athletics, basketball, badminton, volleyball, aerobics, general physical training and preventive exercises. All physical activity in classes is formed taking into account the characteristics of the student population, excluding such types of activities as long-distance running, somersaults, jumping, exercises with holding the breath and straining, etc.

The mixed form of education included an educational program developed by us and implemented since 2015, it took into account sections of the standard form of education and included the replacement of some training hours with the study of theoretical and methodological and practical material using electronic educational technologies (electronic course) with consultation and subsequent monitoring of completed tasks during contact work. Students had the opportunity to learn independently, create individual sets of physical exercises taking into account the disease, and acquired self-control skills not only when performing physical exercises in practical classes, but also in various life situations, including in the conditions of future professional activity [3].

Table 1. ***Formation of groups for the study (n=171)***

Group No.	Year of admission to the university	Form of study		Number of students
		1st semester	2nd semester	
1	2018	Standard	Standard	60
2	2018	Mixed	Mixed	60
3	2019	Standard	Distance	51

Table 2. Student survey questions

Question No.	Survey question
1	I take care of my physical health
2	I understand the value of physical activity
3	I believe that physical education is an effective non-drug means for maintaining and improving health
4	I regularly use physical education to maintain and strengthen my own health (more than 3 times a week)
5	Do you motivate yourself to exercise?
6	I know the signs of fatigue in physical education and sports classes
7	I have basic knowledge of the structure, functions and diseases of human organ systems
8	I conscientiously and regularly keep a self-control diary.
9	I can find the exact wording of the diagnosis(es) by disease code
10	I know methods for assessing the physical development and functional state of the body
11	I can independently determine which exercises are recommended and which are contraindicated for my diagnosis(es)
12	I am able to regulate and adjust physical exercises in accordance with my diagnosis(es)

Distance learning was used in 2020 during the period of restrictions (COVID-19). The program included materials on sections of the standard form of education using electronic educational technologies (electronic course). Additionally, the training program was equipped with video exercise lessons for the preparatory part, sets of exercises for the development of strength abilities, strength endurance and flexibility, as well as preventive sets of exercises.

At the end of the academic year, a survey was conducted to identify the level of acquired knowledge, skills and abilities in the discipline, as well as the level of motivation for practical exercises in physical education.

For each question, answer options were proposed: 4 – the statement is completely true; 3 – more likely to correspond than not; 2 – both yes and no; 1 – rather does not correspond than corresponds; 0 – the statement is completely untrue.

Results of the study and discussion. After conducting the survey, all results were processed and presented in the arithmetic mean (see figure).

An analysis of the results of a survey of students studying in different programs and forms of education showed that students who studied in an experimental educational program in a mixed form of education learned the program material to a greater extent, and there was also an increase in consciousness and motivation for classes. This physical education program promotes a gentler adaptation of students to regular, accessible physical activity. The training program we presented includes self-assessment of objective and subjective indicators during practical physical education classes.

Various theoretical, methodological and practical materials filling the program of a mixed form of education contribute to expanding the knowledge and skills of students in the field of using physical education means to increase the level of physical fitness, to preserve and strengthen the health of students. First of all, it is necessary to motivate people to exercise by explaining the importance and positive impact of physical education on functional and physical fitness. Motivation for exercise will increase not only due to the emotional and social component of the exercise, but also due to the visible positive effect on the development of physical qualities, health and performance in general.

Conclusions. The use of a mixed form of training program in physical education in the higher education system using electronic educational technologies (electronic course) has a significant impact on increasing the motivational component for physical education among students of a special medical group. Thanks to the inclusion of theoretical material in the discipline program, as well as methodological and practical classes, it increases in students not only the quality of knowledge and skills neces-

sary to carry out physical activity, but also makes it possible to independently select physical exercises, their dosage when organizing independent classes, in order to stabilize, existing deviations in their state of health, exercise self-control and psychomotor development.

The results of our study do not claim to be final, and, moreover, are the basis for further research in this direction.

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Influence of injury on the attitude of female students to further physical cul-tural classes

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Abstract

Objective of the study was to analyze the impact of a sports injury on the attitude of female university students to further volleyball training.

Methods and structure of the study. A questionnaire was developed containing 21 questions, grouped into 3 blocks: the reasons for the injury and the player's condition at the time of injury (6 questions), psychological state during the recovery period (5 questions) and attitude towards further sports activities (10 questions).

Results and conclusions. The opinion of 148 UrFU students who experienced sports injuries, both professional volleyball athletes and unranked students who played volleyball in physical education classes, was studied. It has been established that in physical education classes the level of physical education injuries is quite high and in all respects (causes of injury, severity, location) is practically no different from sports injuries.

Psychological changes and the formation of new behavioral models associated with the consequences of trauma in female athletes and sportswomen also generally coincide. However, a noticeable difference is the more severe and negative subjective reaction of female athletes to the injury.

A comparative analysis of the attitude of female volleyball players to fur-ther activities after suffering an injury indicates a readiness to overcome its conse-quences by increasing self-control and stress resistance, regardless of the cause, location and severity of the injury. The university students are optimistic and plan to continue playing volleyball. When experiencing a situation of injury, female athletes, to a greater extent than female athletes, need help and psychological rehabilitation. A promising approach in this direction is to teach them methods of mental self-regulation, in particular, coping strategies.

Keywords: *volleyball, injury, physical education, sports, attitude to classes, psychological state, coping strategies.*

Introduction. Currently, injuries, according to one of the leading lights of Russian sports medicine, Professor A.G. Dembo are an "occupational disease of athletes" [2]. Among team sports games, the specifics of injuries for football, handball and basketball have been studied in detail. There is much less information on volleyball [1]. Basically, the causes, patterns of localization of injuries and methods of physical rehabilitation of athletes are studied. Research on the role of the psychological factor in various aspects of sports injuries seems interesting [3, 4].

Objective of the study was to analyze the impact of a sports injury on the attitude of female university students to further volleyball training.

Methods and structure of the study. A questionnaire was developed con-sisting of 21 questions, grouped into 3 blocks: the reasons for the injury and the player's condition at the time of injury (6 questions), psychological state during the recovery period (5 questions) and attitude towards further sports activities (10 questions). The study involved 189 female students, age 18.5 ± 0.5 years, studying as part of physical education with a specialization in volleyball, as well as in the volleyball section of UrFU. Before the start of the study, female students were asked whether they had been injured during classes. Of these, 148 (78.3%) answered in the affirmative, the remaining 41 (21.7%) had no injuries. Female volleyball players who

had no previous injuries did not take part in the further survey.

Results of the study and discussion. The sample of female students who experienced trauma consisted of 148 people, who were divided into two groups. The first group (A) included female volleyball players from category I to candi-dates for master of sports. It consisted of 33 people (22.3%), all athletes. Among professional volleyball players, 21 people were injured during the training period, 9 during the competitive period, and 3 during training camps. The second group (S) included female students without ranks who played volleyball only during physical education classes at the university. There were 115 people (77.7%).

It was found that out of the entire sample, 104 (70.3%) of the injuries experienced by students were mild (1–7 missed training days), 34 (23.0%) were moderate (8–21 missed training days) and 10 (6.7%) – severe (more than 21 missed training days). By location, in 82 cases (55.4%) the lower extremities were damaged, in 63 (42.6%) - the upper extremities and in 3 (2.0%) - the torso. Most injuries occurred between the ages of 14 and 18. The obtained results on the statistics of injuries in volleyball are generally consistent with the literature data [1, 2].

5 main causes of injury have been identified. 53 people were injured from chronic physical overstrain, of which 10 were female athletes (A), 43 female sports students (S), 36 people were injured due to decreased self-control (A – 7, S – 29). At the peak of the maximum physical load, 28 people were injured (A – 8, S – 20). Due to emotional exhaustion, 12 people were injured (A – 3, S – 9) and 11 people were injured as a result of collisions (A – 5, S – 6). In addition to these reasons, 8 female students without grades highlighted secondary ones, such as lack of warm-up or falling.

Most of the experiences of the respondents at the time of injury were due to the fact that they were unable to achieve the desired result - 33 people (A – 10, S – 23), they were confused and did not know how to cope with the situation, 12 people (A – 4, S – 8), were worried about the very fact of getting injured – 10 (A – 4, S – 6).

Among female students without a rank, 95 people who were injured were determined to return to their previous form. Despite the severity of the injury, most of the female students were motivated to continue playing volleyball. In their responses, they noted the great positive role of support from loved ones, the correct preparation of a rehabilitation plan and awareness of the importance of further physical improvement in their lives. In general, based on the results of the survey, there was a clear understanding that the severity of the injury does not play a role.

Among professional athletes, 17 people believed that they would return to their previous form. At the same time, almost half (16 people) thought that they would not be able to return to their original state. They were in a depressed state, felt helpless, and even considered ending their sports career.

The majority of female students did not change their attitude towards classes after the injury – 80 respondents (A – 16, S – 64). A slight change was observed in 53 people (A – 13, S – 40). They began to take a more conscious approach to the training process, devote more time to warming up and working on strengthening the ligamentous-muscular system. In 15 people, the injury significantly affected their attitude towards classes (A – 4, S – 11). This contingent of volleyball players has completely changed their attitude to training. The girls adjusted their goals so as not to worsen their health conditions and avoid re-injury.

After the injury, 29 female students realized that they needed to devote more time to psychological health (A – 5, S – 24), 47 people emphasized the importance of self-control (A – 12, S – 35). Another 72 respondents noted that it is necessary to properly distribute physical activity and rest (A – 16, S – 56). After returning to physical activity, 78 female students became cautious and more collected (A – 11, S – 67), 41 people trained as if nothing had happened (A – 14, S – 27), and the remaining 29 respondents were confident in themselves, but they began to treat training more consciously (A – 8, S – 21). An increase in self-control during training and competitions was observed in 106 people (A – 25, S – 81).

123 female students understood that the duration of recovery depends on their desire and motivation (A – 28, S – 95). 86 students without a grade believe that during the rehabilitation period they have matured and become more responsible (they listen to their body, control their thoughts). Among professional athletes, 25 people agreed with this statement. After experiencing trauma, 128 female volleyball players noted that they began to value their health and their body more (A – 26, S – 102). 106 girls rated the experience as a significant stage in their lives (A – 15, S – 91).

Some professional volleyball players (21 people), on the recommendation of a sports psychologist, began to use coping strategies in stressful situations and devote more time to working with their psychological state. Volleyball players without a category (53 people) were mainly limited to work in the gym and began to devote more time to technical training.

When discussing the results obtained, it is advisable to note that among the responses of female volleyball players and female volleyball players, there are much more similarities than differences. First of all, this concerns the very fact of injury and its characteristics. In terms of severity, location, and causes of occur-rence, injuries of female athletes are practically no different from those of female athletes. The high level of injuries among female students playing volleyball in physical education classes suggests that the goals of physical education in the edu-cational process are not fully achieved.

Psychological changes and the formation of new behavioral models associated with the consequences of trauma in female athletes and sportswomen also generally coincide. The only noticeable difference is the more severe and negative reaction of female athletes to the injury. If among injured female volleyball players 82.6% were optimistic, then among female athletes only 51.5% shared such optimism, which reflects the high personal importance of sports activities for them.

It seems promising that all volleyball players use strategies to overcome stress (coping strategies), which include assessing the situation, choosing a behav-ioral strategy and performing specific actions [4]. It is known that athletes with a high level of resilience, who take care of their psychological state, endure sports injuries more easily [3].

Conclusions. A comparative analysis of the attitude of female volleyball players to further training after suffering an injury indicates a readiness to overcome its consequences by increasing self-control and stress resistance, regardless of the cause, location and severity of the injury. It was revealed that female university students are optimistic and plan to continue playing volleyball. When experiencing a situation of injury, female athletes, to a greater extent than female athletes, need help and psychological rehabilitation. A promising approach in this direction is teaching them methods of mental self-regulation, in particular, coping strategies (strategies for overcoming stress).

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Psychology of social inertia in the sphere of physical recreation and conditions for its overcoming

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Abstract

Objective of the study was to identify the psychological mechanisms of the emergence of social inertia in the field of physical recreation and ways to overcome it.

Methods and structure of the study. The methodological basis of the study was based on empirical and interdisciplinary approaches, based on theoretical analysis and generalization of the literature.

Results and conclusions. Objective and subjective reasons for the social inertia of individuals in relation to their health and manifestations of social activity contribute to the emergence of a state of deprivation associated with a biologically complete, but psychologically insufficient living environment, which leads to a violation of the overall state of health.

The development of ways to overcome the psychology of social inertia should include, first of all, the restructuring of the mass consciousness of people, their traditional way of life, traditions and habits.

Keywords: *physical recreation, physical and mental development of a person, ways to overcome social inertia, physical education.*

Introduction. The main content of the way to overcome social inertia is to address the individual. A tactical solution to the problem of social inertia is possible taking into account the specific social situation in which the individual's life activities take place. I.S. Kohn also described in detail the socio-psychological causes of inertia, which include:

• impersonality of social life, underestimation of the individual-personal principle of being, belittling or limiting the manifestations of human individuality;

• deformation of the principle of the determining significance of social relations in the socio-psychological development of a particular individual. The belonging of individuals to one or another social group is sometimes of a purely formal, nominal nature and is not of significant importance for the individual himself.

• the habitual style of thinking of a particular individual: open, flexible, creative and divergent or closed, rigid, dogmatic and authoritarian [4].

To overcome the accumulated problems in the physical education of the Russian population and ensure its progressive development, it is necessary to comprehensively use a wide variety of types of physical culture in the most diverse spheres of human social life, paying special attention to the sphere of leisure, where physical culture performs, first of all, a health-improving and recreational function and the type of which is designated by the term "physical recreation". But, as noted in many scientific studies, the potential of physical recreation in improving people's health, socio-psychological development of the individual and social relationships is far from being fully used. One cannot but regret the virtual disappearance in

the production of industrial gymnastics, sports clubs at large industrial enterprises, the holding of Health Days, which in the recent past were very popular among workers, and much more. In the study by A.A. Nesterova (2005), for example, lists about 50 of the most popular types of physical education and recreational activities abroad, used by the population of different countries of the world. In Russia, many of the listed types are not only not used in practice, but are even unknown to physical education specialists [5].

Objective of the study was to identify the psychological mechanisms of the emergence of social inertia in the field of physical recreation and ways to overcome it.

Methods and structure of the study. The psychology of an individualist in relation to his health is expressed in the usual, established social attitude: "most people do not care about their health," and "should I spend my free time on preserving and strengthening it if my health does not bother me." This trend is especially evident in youth society. Objective and subjective reasons for the social inertia of individuals in relation to their health, manifestations of social activity contribute to the emergence of a state of deprivation (Latin-deprivation), associated with a biologically complete, but psychologically insufficient living environment, which leads to a violation of the overall state of health. Deprivation can manifest itself in several aspects: the influence of state and public institutions on the formation of the health of their members, which significantly complicates their socialization and increasing responsibility to society for the state of their health.

Overcoming a person's social inertia regarding their health is not an easy task. One of the ways to overcome social inertia is the scientific study of the reasons that cause it, and evaluation criteria for different age and gender groups. Deprivation can manifest itself in several aspects:

1. The sensory aspect - in information hunger, lack of information, knowledge about the changes taking place in the socio-economic life of the country, social changes in the immediate social environment;

2. Emotional aspect - lack of positive emotions, attention to the health of the individual from the surrounding society;

3. Social aspect - weak social influence on the part of state and public institutions on the formation of the health of their members, which significantly complicates their socialization and increased responsibility to society for the state of their health [3].

It is known, for example, that women feel a constant lack of free time, which can be used to maintain their health. Men are less responsible about their health and devote their free time to satisfying other needs. People who work mentally and have a higher educational level are more strict about their health than people who work physically. It is also necessary to take into account the age-related characteristics of the psychophysical development of individuals of different sexes. Girls are superior to boys in terms of psychophysical indicators of their development, and the problem of strengthening their psychophysical health is not as acute for them as for boys. The problem of social inertia is also determined by the individual characteristics of a person:

-subjective assessment of one's health, level of education and personal culture;

- the ability to wisely use your free time, etc.

An important role in shaping the need to preserve and strengthen the health of young people is given to general educational institutions that have such opportunities through the academic subject "physical education". Within the framework of physical recreation, by "formation" we understand the impact not so much on the physical capabilities of the individual, but on his consciousness, feelings, will, and thinking. This way of analysis will allow the formation of stable socio-psychological formations of the individual: a positive attitude towards one's health, motivation, value orientations, awareness of the importance of using physical culture and recreational activities for these purposes. This path involves the influence on individuals of basic social institutions: family, educational institutions, cultural institutions, numerous public organizations, and the media. Another principle for realizing the socio-psychological potential of physical recreation is the principle of using ample leisure opportunities as one of the main culture-forming spheres of human life, a means of acquiring and realizing sociocultural values. In this case, it becomes relevant to study the needs, motives, and interests of individuals that stimulate them to unite in recreational groups [1].

Of great importance is the study of the socio-psychological processes occurring in the group, the nature of the relationships between participants in joint recreational activities, etc. It is clear that these interaction processes differ from the processes occurring, for example, in study groups during physical education lessons. The success of implementing the possibilities of physical recreation in the socio-psychological develop-

ment of the individual and social relations is largely due to the presence of professionally trained personnel, the level of their readiness for independent teaching activities in recreational institutions of various types (health, cultural and educational, in production, etc.). In this case, we will reflect only some aspects of the author's vision of the problem of training personnel in physical recreation, and outline some ways and conditions for its solution. Moreover, according to A.A. Bodalev (2007), many years of experience in introducing a system of training teachers within the framework of the Bologna process (4+2) in the domestic higher education system not only does not justify itself in practice, but can also lead to its collapse. A similar opinion is shared by O.A. Karmadanov (2006); V.F. Kostyuchenko, (2007) and some other authors who believe that there is and was no need for Russia to fully join the Bologna process; our own needs and scale are too great and specific. But this fundamental position in practice is far from being implemented to the proper extent.

In physical education classes in general education institutions, until recently, the needs of students in specific types of physical education, their abilities and capabilities were not taken into account, impersonally balancing everyone, which significantly limited the process of forming an individual's physical culture. Formal, average grades in the academic discipline "physical culture" sharply reduce students' initiative, limit their need for self-realization, self-development, self-improvement, and as a result, give rise to a psychology of inertia, apathy and even a negative attitude towards physical culture [2].

Unfortunately, there is a decline in the role of the family in shaping children's needs for physical education and recreational activities in Russian society. There is an opinion that physical recreation, through its generic concepts "physical culture" and "recreation," is connected with general culture, but the sociocultural potential of physical recreation in personal development is used extremely poorly. Any initiatives that do not fit into the sociocultural situation will inevitably stall and will not give a positive result. It can be argued that one of the ways to overcome psychological inertia and apathy towards physical culture and recreational activities is to increase the general culture of a person, his more active inclusion in the socio-cultural environment.

In solving the problem of overcoming social inertia and passivity in the field of physical culture and recreational activities, one more aspect should be touched upon, related to the conduct of specific empirical research. In sociological research, empirical methods of observation and survey are traditionally used to study the causes of social inertia in the field of physical recreation and methods for assessing it, as they are the most accessible for mass research. At the same time, conducting a formative experiment as part of assessing the results of physical education and recreational activities is associated with the complexity and limitations of research into many social phenomena. A formative experiment and evaluation of its results can be carried out not only by comparative analysis of data from experimental and control groups, but also by constructing a fundamentally new content of the study based on the use of theoretical methods - modeling, design, forecasting, etc. However, these methods are used extremely rarely in domestic studies of physical recreation [6].

Conclusions. The development of ways to overcome the psychology of social inertia should include, first of all, the restructuring of the mass consciousness of people, their traditional way of life, traditions and habits. Addressing the real personality will make it possible to identify the psychological mechanisms of the emergence of social inertia and outline specific ways to overcome it, including in terms of attitude towards one's psychophysical and social health.

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