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Theory & Practice of Physical Culture

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

The role of independent training for university students

Modern scientists consider independence as a personal property that characterizes people with signs of cognitive activity. The structure of independence has three components: independence of judgment and action, the ability to implement important decisions without outside help; responsibility for one's actions and their consequences; internal confidence that such behavior is possible and correct.

In the context of sports activity, independent exercises represent various types of physical activity that a person carries out without the participation of a coach or other specialists. Depending on personal goals, the student himself determines the type, form, intensity and time for organizing training activities.

One of the main reasons for organizing independent training may be the desire to exercise individually in your free time without necessarily visiting a sports club or gym. Often the reason for self-study is an economic factor: the inability or unwillingness to pay for rent, the services of a trainer, or membership in sports clubs. Along with this, time spent traveling to the sports facility is saved.

At the same time, it should be noted the negative factors of organizing independent training. The absence of a trainer can lead to traumatic exercises. Some people find it difficult to maintain motivation and self-discipline when training alone without systematic stimulation and control.

As modern research shows, the professional training of future specialists at a university requires young people to independently master the competencies of their future specialty. Many authors indicate that the organization of independent physical training provides students with the opportunity to develop skills in exercising freedom of choice, the ability to self-assess their actions and personal responsibility for decision making.

In the process of independent training activities, mechanisms are implemented that ensure prolonged physical activity of students, expressed in the formation of their value orientations towards mastering professional competencies and improving the quality of life.

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

Editor-in-Chief of TPPC, Honored Worker of Physical Culture of the Russian Federation
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Theory and Practice of Physical Culture

Contents

New contours of development of higher professional education in the field of physical culture and sports

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Abstract

Objective of the study was to identify current trends in the development of theory and practice of personnel training based on modern principles of building a system of professional education in the field of physical culture and sports.

Methods and structure of the study. An analysis of information and analytical materials was carried out based on the results of monitoring the activities of educational organizations of higher education in Russian universities of physical culture and sports.

Results and conclusions. Currently, higher professional education in the field of physical culture and sports is undergoing transformations determined by the requirements of the modern labor market. The outlined contours of the development of higher education in the field of physical culture and sports are closely related to the formation of multi-stage education (bachelor-master), an increase in the number of student populations, the predominance of public sector students, a reduction in the number of implemented enlarged groups of directions, and the development of the "specialization" of higher sports education. The identified trends determine further ways to improve the theory and practice of industry education aimed at training specialists in the field of physical culture and sports.

Keywords: *higher professional education, physical culture, sports.*

Introduction. The branch of physical culture and sports covers sports organizations of various structures, the tasks of which change in accordance with the demands of public life. In this regard, the construction of a multicomponent personnel training system should be carried out on a methodological basis that creates conditions for the diversification of tasks, functions, structure and content of professional training [6].

Building an effective modern system for training physical education personnel ensures a symbiosis of such methodological principles as:

- compliance of the personnel training system with the essence and strategy of state policy in the field of physical culture and sports;
- implementation of continuity of the training process for specialists in the physical education and sports industry;
- ensuring predictability of the nature of training;
- designing interdisciplinarity of types of training in combination with in-depth specialization in the field of physical culture and sports;
- monitoring of professional preparedness;
- achieving optimal multi-level structure of the education system.

The proposed principles of the physical education system reflect the ideas of professional training of specialists in the field of physical culture and sports, determine the ways of transforming the scientific and innovative complexes of the system of continuous professional education [4].

Making management decisions in designing an effective multi-level structure of the education system is based on the results of systematic monitoring of the professional indicators of training of industry specialists. Thus, it becomes relevant to select a configuration of quantitative and qualitative indicators for monitoring higher education in the field of physical culture

and sports, which make it possible to determine the current and future contours of the system of the Russian sports educational space.

Objective of the study was to identify current trends in the development of theory and practice of personnel training based on modern principles of building a system of professional education in the field of physical culture and sports.

Methods and structure of the study. An analysis of information and analytical materials was carried out based on the results of monitoring the activities of educational organizations of higher education in Russian universities of physical culture and sports.

Results of the study and discussion. Higher professional education in the field of physical culture and sports is characterized by both general and distinctive features, which are determined by the types of professional activity.

Despite the overall reduction in the number of Russian universities from 741 in 2018 to 722 in 2022, a group of 14 state sectoral universities of physical culture (5 universities, 6 academies and 3 institutes) subordinate to the Ministry of Sports of the Russian Federation (1.9% of the total number of Russian universities), remained unchanged [1]. This situation is explained by a number of factors - the state policy pursued in the country for the development of the sphere of physical culture and sports in the country, the needs of the modern labor market, the social significance of physical culture in the formation of a healthy lifestyle of the population, etc. A similar situation characterizes the dynamics of the student population. In contrast to the trend of reduction in the number of Russian students (2017 - 4246 thousand people, 2022 - 4044 thousand people) [1, p. 204], the quantitative parameters of students in physical education universities increased during this period from 34, 4 thousand people up to 34.8 thousand people

It is necessary to identify the distinctive features of differentiation of the student population of sports universities, the criteria of which are such indicators as the form of education, level of education, sources of funding (Table 1).

Analysis of statistical data allows us to identify the specific social characteristics of students in sports educational organizations. First of all, we are talking about the distribution of students according to forms of education. Currently, there are 2.5 million people in Russian universities. (61.2%) are studying full-time, 0.2 million people. – full-time and part-time (6.5%) and 1.3 million people. (32.3%) – by correspondence [1, p. 204], then physical education universities, with a similar proportion of full-time students (57.8%), are distinguished by a higher proportion of part-time students (42.2%). This feature is determined by the lack of full-time and part-time education in federal state educational standards in the field of physical culture and sports. Certain nuances of the distribution of students by level of education are also recorded - for example, if in Russia as a whole 68.7% of students are currently studying in bachelor's programs, 18.4% in specialty programs and 13% in master's programs [3], then in sports universities due to absence of specialties, 86.6% of students are in bachelor's degree and 13.4% are in master's degree. It should also be noted that a characteristic feature of physical education universities is the predominance of students studying at the expense of budgetary funds (2017 budget/contract ratio was 74.8% and 25.2%, 2022 - 77.5% and 22. 5%). The average Unified State Exam score of applicants to study at sports educational organizations is also noteworthy. Statistical data record the positive

Table 1. *Student population at Russian universities of physical education [2]*

Form of study	Number of students	
	2018	2022
	34389	34769
Including full-time education (people)	19933 57,9%	20093 57,8%
By correspondence education (people)	14456 42,1	14676 42,2%
Including students enrolled in bachelor's degree programs (%)	88,1	86,6
Including students enrolled in master's degree programs (%)	11,9	13,4
Including students studying at the expense of budgetary funds %	74,8	77,5
Including students on a contractual basis %	25,2	22,5

Table 2. *Differentiation of the student population of Russian universities of physical education by field of education [2]*

Field of education	The number of students enrolled (thousand people) (the given contingent)	
	2017	2022
Social Sciences	1969,1	1323,8
Education and pedagogical sciences	745,7	1057,1
Humanitarian sciences	18542,5	19020.9
Arts and culture	172,2	158,8
Total	21429,5	21560,6

dynamics of this indicator - so if in 2018 the average Unified State Examination score of those enrolled in physical education universities was in the range from 54.5 to 72.4 points, then in 2022 this figure ranged from 52.2 to 77.6 points.

A separate aspect of the social composition of students at sports universities is its differentiation by field of education (Table 2).

The field of education is a set of enlarged groups of specialties and areas of training related to a specific field of activity. As follows from the table above, the main field of education in sports universities is "Humanities"; the number and proportion of students studying in it increased in 2017-2022. with 18.5 thousand people. (86.5%) up to 19 thousand people. (88.2%). The indicators of the group of students studying within the "Education and Pedagogical Sciences" group also increased from 0.7 thousand people. (3.5%) to 1.1 thousand people. (4.9%). At the same time, during the period under review, the quantitative parameters of students in areas of training related to the fields of education "Society Sciences" decreased (2017 - 1.9 thousand people (9.2%), 2022 - 1.1 thousand people (6.2%)), and "Art and culture" (2017 – 172.2 people (0.8%), 2022 – 158.8 people (0.7%)). The changes that took place directly affected the differentiation of the student population of physical education universities by enlarged groups of specialties and directions (EGSD) (Table 3).

The presented data shows that in the period 2017-2022. There was a reduction in the number of consolidated groups of specialties and areas within which the educational activities of physical education universities were carried out. This dynamics indicates that in the field of physical culture and sports, the trend of "specialized" higher education has increasingly begun to manifest itself. If relatively recently, industry universities increased training in a wide variety of areas - sports management, journalism, sports and health services and tourism, state and municipal administration, advertising and public relations, sports diplomacy, then during the study period, against the

Table 3. *Distribution of the student population of physical education universities by enlarged groups of specialties and directions [2]*

Implemented EGSD	Contingent provided	
	2017	2022
38.00.00 – Economics and management	586,6	489,7
41.00.00 – Political sciences and regional studies	66	48,0
42.00.00 – Mass media and information and library science	622,8	149,9
43.00.00 – Service and tourism	487,9	551,8
44.00.00 – Education and pedagogical sciences	745,7	1057,1
49.00.00 – Physical education and sports	18533,2	19020,9
37.00.00 – Psychological sciences	32,4	18,8
39.00.00 – Sociology and social work	170,5	65,6
51.00.00 – Cultural studies and sociocultural projects	172,2	158,8
40.00.00 – Jurisprudence	2,9	0
32.00.00 – Health Sciences and Preventive Medicine	4,0	0
46.00.00 – History and archeology	10	0

background of a decrease in students in non-core areas of training began to increase quantitative indicators of the number and proportion of students studying in the main enlarged group of specialties and areas of EGSD 49.00.00 - Physical culture and sports (49.03.01; 49.04.01 - Physical culture, 49.03.02; 49.04.02 - Physical culture for persons with health problems, 03.49.03 – Recreation and sports and health tourism; 04.49.03 – Sports). In total, in 2022, the student population of this group amounted to 19 thousand people. (88.2% of students). Next in terms of quantitative indicators is EGSD 44.00.00. – Education and pedagogical sciences (1.1 thousand people (4.9%). The remaining 6.9% of students in descending order fall on EGSD 43.00.00 – Service and tourism, EGSD 38.00.00 - Economics and management, EGSD 51.00.00 – Cultural studies and sociocultural projects, EGSD 42.00.00 – Mass media and information and library science, EGSD 39.00.00 – Sociology and social work, EGSD 41.00.00 – Political sciences and regional studies, EGSD 37.00.00 – Psychological sciences.

Foreign students are a separate segment of the student body at Russian sports universities. Statistical data shows a downward trend in the number and share of this group: if in 2018 there were 1,560 foreigners studying at industry universities (3.9% of the total number of students), then by 2022 these figures dropped to 1,447 people. (3.8%). The majority of foreign students at physical education universities were citizens of the CIS countries, Asia and the Middle East. The decrease in the foreign contingent, on the one hand, is determined by objective external conditions (complicated geopolitical and epidemiological situation), and internal factors associated with the insufficient internationalization of the educational environment of sports universities. In this regard, the task arises of intensifying international activities in the sports educational space.

The most important parameter of higher professional education in the field of physical culture and sports is the personnel potential of industry universities. According to statistics, the training of future specialists in sports universities is carried out by more than two thousand employees from among the teaching staff. Personnel potential is characterized by the following indicators: the share of teaching staff with academic degrees is 63.3%; the share of teaching staff in the age category under 65 years is 82.3%; the share of full-time teaching staff is 82.3%. This indicates that while there is undoubted compliance with the requirements of federal state standards for staffing the educational process, it is necessary to pay close attention to the issues of increasing the degree of teachers and rejuvenating human resources.

Conclusions. The analysis outlined the contours of the development of higher education in the field of physical culture and sports, which are closely related to the formation of multi-stage education (bachelor-master), an increase in the number of student populations, the predominance of public sector students, a reduction in the number of implemented enlarged groups of directions, the development of the “profile” of higher sports education. The identified trends determine further ways to improve the theory and practice of industry education aimed at training specialists in the field of physical culture and sports.

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Formation of a project culture among future managers of the sports industry in vocational education

UDC 378 (UDC 378.147)

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Abstract

Objective of the study was to develop a project culture for future managers of the sports industry based on the application of the project method in professional education.

Methods and structure of the study. The project culture of future managers of the sports industry is considered as a set of cognitive, value, activity, reflective and motivational components, which have their own levels of development, achieved in the process of students implementing project activities. A pedagogical experiment was carried out with students of the 2021 intake of the training direction 38.03.02 “Management” in the period from February 2023 to October 2023. The students were given the following tasks: creating a short-term individual mini-project within the framework of the educational special discipline “Marketing” and active participation in group projects of extracurricular activities. Using a specially designed questionnaire, research participants were surveyed before and after the experiment to assess the level of development of the components of the project culture.

Results and conclusions. Analysis of the data obtained from a survey of sports industry managers showed that the use of the project method in the learning process provides positive dynamics, since according to all criterion indicators, the components of the project culture have increased. It is shown that the project method of teaching can become a key element in the formation of a project culture among future managers of the sports industry, providing students with the development of the necessary skills, knowledge, and personal qualities for a successful professional career.

Keywords: *project method, project culture, students, manager, sports industry, vocational education.*

Introduction. In modern conditions of social development, vocational education must take into account changes in the business environment and provide students with not only theoretical knowledge, but also practical skills that will contribute to a successful career and adaptation in the labor market. Rethinking the goals and results of vocational education is focused on new approaches to learning that tend to develop culture, creative directions for students, aimed at self-development and self-understanding of their future work activities, taking into account rapidly changing environmental conditions. In this context, the project-based teaching method is becoming increasingly popular and is considered in vocational education as a relevant method of knowledge transfer.

The modern approach to the project-based learning method in vocational education provides students with the opportunity to develop not only cognitive, but also interpersonal, innovative and creative skills in terms of creating new products/services for the future professional field. It emphasizes a problem-based and hands-on approach to learning, allowing you to solve real-life problems and create useful products through projects. This form of learning stimulates independence, creativity and initiative, providing students with the opportunity to apply acquired knowledge in real situations [1].

Analysis of specialized literature in the context of studying the competency-based approach and professional self-development made it possible to estab-

lish a theoretical connection between the emergence of project culture as a modern multidimensional phenomenon in the process of implementing project activities [2, 3, 4, 6]. Project culture is associated with such personal and professional qualities of a specialist that are in demand in work activity, as innovative readiness, reflexivity, creativity, critical thinking, skill, research skills, value rationality, inventive thinking, etc.

Objective of the study was to develop a project culture for future managers of the sports industry based on the application of the project method in professional education.

Methods and structure of the study. The project method in education provides students with the opportunity to develop not only cognitive, but also interpersonal, innovative and creative skills in terms of creating new products/services for the future professional field. It emphasizes a problem-based and hands-on approach to learning, allowing students to solve real-life problems and create useful products through projects. This form of training stimulates independence, creativity and initiative of students, giving them the opportunity to apply the acquired knowledge in real situations [1].

The use of the project method in educational and extracurricular activities contributes to the formation of a project culture of future specialists, which can be considered from the perspective of a component structure. Thus, the **cognitive component** involves a theoretical study of the fundamentals of project activity. The **value component** is determined by identifying current problems in the sports industry, goal setting, determining the structure of needs and values of the sports industry, etc. The **activity component** is manifested through the skills and abilities of students' project activities in the process of educational and extracurricular activities. The **reflexive component** is the mastery of methods of self-assessment, self-analysis and self-control of project activities. The motivational component determines interest in creativity, learning, and the search and application of innovative solutions in sports activities.

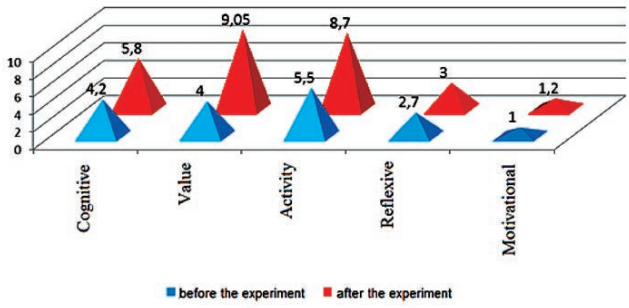
The formation of a project culture in vocational education is ensured by organizational and pedagogical conditions that contribute to the effective implementation of a structural and content model, where the totality of cognitive, value, activity, reflective and motivational components of a project culture have their own levels of development, achieved in the process of students implementing project activities [5].

The three-level criterion scale for assessing the maturity of the project culture is presented as follows: initial, middle and highest levels. It should be noted that the highest level of development of a student's project culture is the main prerequisite for the development of mental activity.

A pedagogical experiment was carried out with students of the 2021 intake, training direction 38.03.02 "Management" in the period from February 2023 to October 2023. The students were given the following tasks: creating a short-term individual mini-project within the framework of the educational special discipline "Marketing" (forming project indicators) and active participation in group projects of extracurricular activities (scientific and creative activities). The number of students on the payroll in the experimental group at the time of the pedagogical experiment was 20 people.

Using a specially designed questionnaire, research participants were surveyed before and after the experiment to assess the level of development of the components of the project culture.

Results of the study and discussion. The figure clearly shows the positive trend in the formation of project culture components when organizing educational and extracurricular activities using the project method.



Dynamics of the formation of components of the project culture level before and after the experiment (recruitment year 2021), in points

The results of the experiment show that the **cognitive component** increased by 1.6 points; the **value component** showed positive dynamics by 5.05 points; the **activity component** increased by 3.2 points; reflective component – by 0.3; **motivational component** – by 0.2 points.

Analysis of the data obtained from a survey of sports industry managers leads us to the conclusion that the use of the project method in the learning pro-

cess provides positive dynamics, since according to all criterion indicators, the components of the project culture have increased.

Conclusions. The project-based teaching method does not lose its relevance at the present stage and is an effective approach to education in the professional field. It combines active and practical learning, development of key competencies, connection with real professional practice, motivation and preparation of students for professional activities.

However, when implementing the project-based teaching method, it is necessary to take into account a number of problems and challenges, such as: lack of time, difficulties in assessment, heterogeneity of the group, lack of experience and training of teachers, resource limitations, resistance to change and lack of motivation on the part of both students and professors - teaching staff. Solving these problems requires efforts on the part of educational institutions, teachers and administrators.

The study shows that the project teaching method can become a key element in the formation of a project culture among future managers of the sports industry, providing students with the development of the necessary skills, knowledge, and personal qualities for a successful professional career.

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Current opportunities and challenges for scientists in the field of sports biomechanics

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Abstract

Objective of the study was to provide the academic community with a brief overview of the current state and development of sports biomechanics.

Methods and structure of the study. General research methods are used, such as analysis and synthesis, formalization, deduction, generalization, as well as the historical method. Scopus, Web of Science, Science Direct and Elibrary databases were used for the literature review. We considered publications in which biomechanics appears both from a general theoretical position and from the point of view of its specific applications.

Results and conclusions. As a scientific field, sports biomechanics conducts an in-depth analysis of the characteristics and patterns of biomechanical movement of organisms. This is a key aspect for understanding the complex mechanisms of movement in biological systems and for effectively controlling human movements. In this context, the biomechanics of sports promises to achieve even deeper development and provide more advanced theoretical and technical support for human health and physical activity.

Keywords: *biomechanics of sports, technical application, healthy lifestyle, possibilities of biomechanics, challenges of biomechanics.*

Introduction. In world science, modern biomechanics of sports faces many prospects and challenges. The growth of research devoted to the biomechanics of sports emphasizes the growing importance of this discipline, as shown, in particular, by data from the EBSCO Discovery Service [10]. Indeed, over the past fifty years there has been significant development in motion analysis systems and computer simulations of sports movements [9]. However, scientists in this field face certain problems and challenges. In particular, in the Russian academic environment today there is a decrease in interest in biomechanics [3]. Therefore, discussion of the topic of sports biomechanics is extremely relevant.

Objective of the study was to identify current opportunities and challenges for scientists in the field of sports biomechanics.

Methods and structure of the study. General research methods are used, such as analysis and synthesis, formalization, deduction, generalization, as well as the historical method. Scopus, Web of Science, ScienceDirect and Elibrary databases were used for the literature review. We considered publications in which biomechanics appears both from a general theoretical position and from the point of view of its specific applications.

Research results and discussion. Biomechanics arose from the human need to quantify the interactions of both endogenous and exogenous forces using mechanical laws and postulates. Since the beginning of the second half of the 20th century, biomechanics has become a fundamental tool and an autonomous discipline with broad research potential [5].

From a conceptual point of view, the biomechan-

ics of sports is a field of kinesiology, which is a set of concepts, laws and principles that reflect biophysical, somatopsychic and didactic mechanisms in human life [1]. The key points in theoretical modeling and simulation calculations in sports biomechanics are the muscle constitutive theory and the calculation of muscle strength [6].

In the context of modern scientific and technological progress and globalization, the field of sports biomechanics is faced with unprecedented opportunities. Thus, the application of sports biomechanics covers a wide range of areas: pedagogical training of future athletes, sports training, rehabilitation medicine, scientific research in the field of sports, design of sports products, sports medicine research. Sports biomechanics is also applicable to improving human health and optimizing athletic performance. Overall, the status and application fields of sports biomechanics are increasingly worthy of attention, and it plays an indispensable role in the development and application of sports science.

It is important to note that the revolutionary change in the field of sports science is the application of technology. Current global trends indicate a continuous expansion in the depth and breadth of sports science research, which is mainly driven by advanced technologies (e.g., 3D motion analysis technology, neuroimaging technology, biosensors and smart devices) [8], the fusion of big data and artificial intelligence [9], increased research into the intrinsic links between health and physical activity, and increased interest in the psychological and social aspects of sport. At the same time, an urgent task for modern sports biomechanics remains the development of methods that make it possible to determine optimal sports techniques for specific athletes. Thus, it has recently been called the “holy grail of sports biomechanics” [7].

It should also be noted that in the context of globalization, the union of international cooperation and competition serves as a driver of scientific research, providing complementarity and playing an important role in the field of knowledge and innovation, which has a positive effect on scientific progress [4]. Overall, international cooperation and competition create a unique dynamic balance in the field of sports biomechanics. This balance stimulates innovation and progress in the field, and provides new perspectives and methods for addressing health and mobility issues at a global level.

However, analysis of current trends in the development of sports biomechanics allows us to identify key challenges in this area:

- Challenges of data processing and analysis. The key issues here are data processing, analysis and interpretation. It is also difficult to integrate and interpret data at different levels. To overcome these challenges, it is necessary to continue to develop new data processing methods and use advanced analysis technologies.

- Ethical and privacy challenges. Here, the main task remains the simultaneous protection of the interests of researchers; its solution can be the development of clear licensing and data sharing policies.

- Challenges to traditional beliefs and culture. Traditional sports programs often have a long history and tradition, traditional training methods and skills are deeply ingrained, so the introduction of biomechanics may face challenges in terms of acceptability and adaptation. Studying the cultural characteristics of sports practices can mitigate this problem.

- Increased public awareness and acceptability. An important issue is the need to increase public awareness and acceptance in the process of popularization and dissemination of biomechanics, which makes science education and awareness especially important.

Conclusions. Thus, as a scientific field, sports biomechanics conducts a deep analysis of the characteristics and patterns of biomechanical movement of organisms. This is a key aspect for understanding the complex mechanisms of movement in biological systems and for effectively controlling human movements. As G.P. Ivanova noted a decade ago, discussing the development of sports biomechanics, this “doping is not prohibited, but not known to everyone” [2]. In this context, the biomechanics of sports promises to achieve even deeper development and provide more advanced theoretical and technical support for human health and physical activity.

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Speed characteristics of jumpers in a running triple jump

UDC 796

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Abstract

Increasing competitive results is a hot topic for specialists and athletes in any sport. This study analyzes previously obtained data on horizontal jumps. An assessment was also made of the speed capabilities of the best Russian triple jump jumpers, and the dependence of the quantitative values of the speed realization coefficient and the speed difference in the last and penultimate 5-meter run-up sections for highly qualified jumpers was experimentally proven. The work provides an assessment of the speed parameters of training runs with and without push-off. A comparative analysis of the performance of training and competition runs made it possible to identify differences in the speed characteristics and efficiency of jumping techniques of jumpers. As a result of the study, it was found that the best Russian triple jumpers have significant speed capabilities, which they successfully implement during competitive run-ups. The coefficient of speed realization and the difference in speed in the last sections of the run-up turned out to be significant indicators reflecting the efficiency of the jump and the level of training of the athletes. It is also worth noting that the preparation of jumpers for take-off significantly affects their speed characteristics. Analysis of training runs showed that the lack of take-off affects the jumper's speed drop. This demonstrates the importance of proper take-off technique and its impact on overall jump performance. In general, the study allows us to better understand the speed capabilities of triple jump jumpers, as well as the influence of preparation and various factors on the results of the competition. The data obtained can be useful for coaches and athletes, helping them optimize training programs and jumping technique in order to achieve the highest results.

Keywords: *athletics, highly qualified jumpers, speed capabilities, horizontal jumps, triple jump.*

Introduction. In the circles of horizontal jump professionals, everyone unanimously recognizes that high speeds in the last stages of the takeoff play an important role in achieving them. This can be done due to the jumpers ability to concentrate maximum speeds during this phase of training. Based on research by experts on long and triple jump techniques, one can clearly see the importance of high speed in the last steps of the run-up to achieve excellent results. If we consider the dependence of the competitive result and speed on the last 5-meter run-up section, we will see the result in the range from 0.730 to 0.943. The pattern of this parameter can be most clearly observed in all categories of jumpers-athletes, starting from the second category and up to an international master of sports. Additionally, it should be noted that the strongest long and triple jumpers achieve speeds similar to those of the best sprinters. Moreover, some outstanding jumpers have also shown their talent in the 100 meters and 200 meters, ranking among the best athletes in the world.

Objective of the study was to analyze and assess the speed abilities of the best Russian triple jumpers, to consider how much the competition results depend on the application of these research parameters. Also in the study, it was possible to experimentally prove the dependence of such parameters as the quantitative values of the speed realization coefficient and the difference in speed in the last and penultimate 5-meter run-up sections for highly skilled jumpers [1].

Methods and structure of the study. The work used the method of content analysis of literary sources, the method of photodiode timing (accuracy of 0.001 seconds). The study involved 23 of the strongest jumpers in the Russian Federation. The study was carried out at the Russian championships in 2007 by members of the complex scientific group. The staff analyzed the data obtained during the preparatory and competitive periods.

Results of the study and discussion. In the first part of the study, we obtained indicators for comparing the speed parameters of the finalist jumpers among men, which are shown in Table 1.

For men, with a difference in the competitive result of the finalists of the World Championship among the finalists of the Czech Republic of 0.78 m (4.5%), the difference in speed in the last section of the run-up is 0.48 m/s (4.8%). Considering that on average 0.1 m/s, all other things being equal, gives an increase in the triple jump for men of 0.26-0.29 m (A. Oganjanov, 1990; G. Samoilov, 2002), we can conclude that the lag our triple jumpers from world athletes in this event is due to the low speed in the last steps (Table 1) [1].

The implementation of speed capabilities is assessed by the speed implementation coefficient, which shows how many percent jumpers use their speed capabilities during the take-off run (V. Kreer, 1992). In the scientific and methodological literature on horizontal jumps there is no experimental substantiation of the quantitative value of this coefficient for qualified jumpers and vaulters.

We tried to fill this gap by using photodiode timing to record the speed in the last 5-meter section of the run-up when running it without take-off, with the last part of the run-up set to the maximum speed and with take-off. Based on the difference in speed values during such run-up options, the magnitude of the speed drop as a result of the jumpers' preparation for take-off was determined 7 men. The results are shown in Table 2 [2].

For men, the average value of the drop in speed when preparing jumpers for take-off was 0.204 + 0.073 m/s; for women -0.110 + 0.125 m/s. Thus, the model value of the drop in speed as a result of preparation for repulsion can be taken as 0.1-0.2 m/s and a speed realization coefficient of 98-99%. A rate of less than 97% is an indication that the jumper is over-preparing for the first take-off of a triple jump. This is due either to the desire to increase the trajectory and vertical component of the take-off speed, or to shortcomings in the jumper's special speed-strength preparedness and inability to push off at full speed.

The next stage of the study was to assess the speed capabilities of the jumpers. The speed realization coefficient, expressed as a percentage, was calculated (Table 3) [1].

The obtained coefficient value (about 99%) indicates a high degree of use of speed capabilities in

Table 1. *Comparison of the run-up speed parameters of jumpers-finalists of the Russian Championship 2007*

No.	Last name	Speed next to last. 5 m take-off, m/s	speed at last. 5 m run-up, m/s	Speed increase, m/s	Competitive result, m
1.	Sportsmen 1	9,92	10,02	0,10	16,94
2.	Sportsmen 2	9,90	10,18	0,28	16,91
3.	Sportsmen 3	10,22	10,44	0,22	16,88
4.	Sportsmen 4	9,80	9,98	0,18	16,63
5.	Sportsmen 5	9,51	9,78	0,27	16,55
6.	Sportsmen 6	10,00	10,04	0,04	16,43
7.	Sportsmen 7	9,52	9,69	0,17	16,42
8.	Sportsmen 8	9,67	9,82	0,15	16,37
Average HR		9,81±0,23	9,99±0,22	0,18±0,08	16,64±0,22
PD standard deviation		0,23	0,22	0,08	0,22
PD variation coefficient		2,34	2,20	4,44	1,32
Average World Cup		10,37±0,15	10,47±0,15	0,20±0,12	17,42±0,44
World Cup standard deviation		0,15	0,15	0,12	0,44
World Cup variation coefficient		1,46	1,43	60	2,52
Difference		0,46; D<0,01	0,48; D<0,01	0,02; D<0,05	0,78 D<0,01

Table 2. *Running speed with and without push-off*

Last name	Run-up without repulsion, m/s	Run-up with repulsion, m/s	Difference, m/s	Speed realization factor
Sportsmen 1	9,92	9,65	0,27	97,27
Sportsmen 2	9,88	9.77	0,11	98,88
Sportsmen 3	9,80	9,51	0,29	97,04
Sportsmen 4	10,00	9,73	0,27	97,30
Sportsmen 5	9,11	9,01	0,10	98,90
Sportsmen 6	8,83	8,61	0,22	97,50
Sportsmen 7	9,80	9,63	0,17	98,26
Average	9,620	9,416	0,204	97,87
Art. deviation	0,423	0,405	0,073	

Table 3. *Realization of the speed capabilities of jumpers in a competitive run-up*

Last name	Take-off speed, m/s	Absolute speed, m/s	Difference, m/s	Speed capability realization factor
Sportsmen 1	10,00	10,04	0,04	99,6
Sportsmen 2	10,18	10,54	0,36	96,6
Sportsmen 3	9,96	9,98	0,02	99,8
Sportsmen 4	10,44	10,38	-0,06	100,6
Average	10,15	10,24	0,09	99,1
Standard deviation	0,19	0,23	0,16	1,5

take-off conditions, and good command of take-off technique by Russian jumpers.

Our jumpers' high level of take-off technique is confirmed by their active approach to the bar. This indicator is characterized by a positive difference in speeds in the last and penultimate 5-meter run-up sections (Table 1). This difference for highly skilled triple jumpers should be about 0.2 m/s. For the finalists of the World Cup-97, as well as for the finalists of the Chechen Championship-07, the value of the speed differences is close to the model values (respectively, 0.20 m/s and 0.18 m/s for men; Table 1). A negative value of this parameter characterizes excessive preparation for repulsion and is usually associated with a high "jump" trajectory. This is typical for jumpers who have a pronounced "power" style and "jump-dominant" triple jump technique, as well as for beginner jumpers of 2-3 categories [1].

Conclusions. The recent lag in jumping is due to shortcomings in the speed training of most of our best jumpers and vaulters. At the same time, the special speed-strength and technical training of our athletes is at a fairly high level.

The speed demonstrated by triple jumpers in the run-up is somewhat lower than their absolute speed capabilities shown in the sprint. However, the difference values for highly skilled jumpers should not exceed 0.2 m/s, and the speed realization rate should be 98-99%. Our best athletes have a high indicator of this aspect of technical readiness (99.1%, Table 3), not inferior to the indicators of the world triple jump elite.

The high level of mastery of the take-off technique was also expressed in the rate of increase in speed on the last 5-meter run-up section, which averaged 0.18 m/s for the finalist jumpers of the ChR-07 (Table 1). This is quite consistent with the model values of the speed increase for this qualification of jumpers.

The rate of increase in speed in the last 5-meter section of the run-up, together with the coefficient of speed realization and speed indicators of the run-up, can serve as criteria for assessing the technique of performing this phase of the triple jump [1].

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Actualization of a unified approach to the assessment of injuries in martial arts in the aspect of theoretical analysis of sports practice in Iran

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Abstract

Objective of the study was to actualize the problem of injuries in martial arts and develop a unified approach to systematizing sports injuries and assessing their severity based on the analysis of Iranian scientific literature.

Methods and structure of the study. The work used the method of content analysis of scientific sources published from 2003 to the present, which were conducted in the field of studying the prevalence of injuries or risk factors for injury in Iranian martial artists. In this study, related articles were searched using keywords and specialized databases such as Google Scholar, Sciencedirect, PubMed, SID, Magiran and Irandoc.

Results and conclusions. It has been established that there are actual differences in approaches and methods for assessing the severity of injuries and the localization of these injuries in sports practice in different countries. One of the distinctive reasons is that there are no strict standards and unified methods for determining injury in the sports listed above. Another reason is the obvious differences in the use of terminology to refer to and explain types of injuries, which makes it difficult to generalize the results because the terms and words are not identical.

The authors conclude that the development of a unified approach to assessing injuries and ways to prevent them in martial arts will help achieve a high level of competence of coaches in teaching athletes technical techniques and will reduce the degree of injuries in martial arts.

Keywords: *sports injuries, kickboxing, martial arts, karate, kung fu, judo, limb injury.*

Introduction. In recent years, there has been a significant increase in the number of people interested in practicing combat sports. More than 75 million teenagers around the world participate in these sports activities. Women are also actively involved in martial arts [1, 2].

Along with the popularity of combat sports, the number of injuries is increasing, which represents a pressing scientific and practical problem.

As an analysis of scientific works in the field of sports injuries shows, the attention of scientists and practitioners focuses on epidemiological studies, as well as on identifying risk factors and mechanisms of injury. While a poorly studied area remains the development of unified approaches to defining injuries and assessing the degree of their severity, as well as developing measures aimed at reducing injuries in martial arts [8, 21]. Considering this issue, future research should attempt to find injury prevention strategies and interventions to control risk factors and mechanisms of injury in martial artists [25].

Objective of the study was to actualize the problem of injuries in martial arts and develop a unified approach to systematizing sports injuries and assessing their severity based on the analysis of Iranian scientific literature.

Methods and structure of the study. The work used the method of content analysis of scientific sources published from 2003 to the present, which were conducted in the field of studying the prevalence of injuries or risk factors for injury in Iranian martial artists. In this study, related articles were searched using keywords and specialized databases such as Google Scholar, Sciencedirect, PubMed, SID, Magiran and Irandoc.

The criteria for participation in the study for the selected articles were as follows:

1. Articles must be in Persian or English.

2. Articles must be published in scientific research publications.

3. Articles about combat sports (including boxing, karate, kickboxing, taekwondo, judo, kung fu, wushu and jiu-jitsu).

The criteria for studying the articles were the following parameters: prevalence rate of injuries, location of injury, time of injury (training or competition), severity of injury, type of injury, cause and mechanism of injury, risk factors, season of injury, injury prevention protocols [6, 14, 24].

As a result of the analysis of articles according to specific criteria, 26 articles were selected.

Results of the study and discussion. According to the analysis of scientific and methodological literature, it turned out that the structure of injuries received during training and competitive activity in Iran and other countries is similar [20]. The most common types of injuries are minor. In karate, the greatest number of injuries occurs in the head and neck area, and in kickboxing and judo - in the lower part of the body and are mainly bruises and bruises [10-13, 17]. Most injuries occur due to technical errors during training [12, 22]. In this regard, it appears that the role of coaches in preventing injury to martial artists is very important. Additionally, little attention has been paid to gender differences in martial arts.

When studying the sources, it was revealed that there are significant differences in approaches and methods for assessing the severity of injuries and the localization of these injuries in sports practice in different countries [23].

One of the reasons is that there are no strict standards and unified methods for determining injury in the sports listed above. Some sources list injuries to the upper body without specifying the specific area injured. In the analyzed sources there is no clear description of the injury, the nature of the injury, rehabilitation and recovery of the injuries. Analyzing the sources, it can be assumed that injuries can be repeated, and information about them is missing or not properly recorded [3, 5, 9, 26]. The mechanism of injury is not objectively and fully described, and therefore the distribution of injuries into certain subgroups is difficult [16-19].

Another reason is the obvious differences in the use of various terms and words to refer to types of damage, which makes it difficult to generalize the results because the terms and words are not identical. Scientists and specialists use different approaches to define injuries, damage area, injury mechanisms and their assessment. On this basis, there is a need for theoretical and methodological substantiation of the characteristics of the concepts used in these sports.

Conclusions. Developing a unified approach to assessing injuries and ways to prevent them in martial arts will help achieve a high level of competence of coaches in teaching athletes techniques and will help reduce the degree of injuries in martial arts.

According to Iranian scholars and experts, given that hitting the opponent's body is considered a bonus in martial arts, and that strikes to the upper body and head have more points, it seems that a review of the rules of martial arts and studying their impact in future studies is a smart step that can be taken to reduce injury statistics in these sports.

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Psychophysiological parameters of qualified athletes, players and biathlonists

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Abstract

Objective of the study was to determine the dominant parameters of the psychophysiological state (PPS) in qualified athletes specializing in "sports games and biathlon".

Methods and structure of the study. Vibraimage technology was used with the VibraMed10 program. The objects of the study were highly qualified athletes (candidates for master of sports and masters of sports), specializing in "sports games" (handball, football, rugby) and specializing in "biathlon", who are part of the national teams of St. Petersburg. A total of 28 athletes, 19-22 years old.

Results and conclusions. 1. It has been established that the indicators of aggressiveness, charisma, energy and self-regulation are decisive in the characteristics of high-level gaming athletes. These conditions are significant in the dynamics of the growth of their sports skills. 2. It was revealed that among qualified biathletes, their psychophysiological state is dominated by indicators of balance and self-regulation with subordination of the parameters of inhibition and neuroticism. The growth of professional skills of biathletes is accompanied by directional dynamics of the indicated indicators of psychophysiological state.

Keywords: *vibraimage technology, psychophysiological state, athletes, team sports, biathlon.*

Introduction. Profiling qualified athletes using vibraimage technology allows us to obtain comprehensive information about their psychophysiological state (PPS) [2]. Using vibraimage technology, within 60 seconds it is possible to obtain objective information about the systemic reaction of the athlete's body at the mental, psychophysiological and physiological levels according to ten parameters [5]. Interpretation of complex information about the PPS of qualified athletes, taking into account the type of sport, allows us to identify the leading parameters that are formed in the process of training activities. Parameters of athletes' PPS are revealed in connection with their qualifications; they are necessary for the growth of athletes' qualifications and require formation in training activities. Analysis of the identified general patterns in the dynamics of the parameters of the PPS of qualified athletes, taking into account the type of sport, allows us to detect differences when considering the general values. The data obtained as a result of the study on the specificity of the PPS in qualified athletes, taking into account the type of sport, and the severity of the parameters of their functional readiness can act as goals of the training process.

Objective of the study was to determine the dominant parameters of the psychophysiological state (PPS) in qualified athletes specializing in "sports games and biathlon".

Methods and structure of the study. Vibraimage technology was used with the VibraMed10 program. The object of the study were highly qualified players (candidates for master of sports and master of sports), 28 athletes, aged 19-22 years, specializing in "sports games" (handball, football, rugby) and specializing in "biathlon", included in the national teams of the city St. Petersburg. The proposed technique is based on the principle of transforming video filming into a vibraimage. The recording unit consisted of a video camera and a computer. The subject is positioned in front of the camera at a distance of 80 cm, in a sitting position. Athletes' PFS is assessed using the following indicators: aggression, stress, anxiety, danger, poise, charisma, energy, self-regulation, inhibition, neuroticism. After analyzing the information for each particular characteristic, a conclusion is made, reflected in the final quantitative assessment of the PPS, which allows the resulting state to be correlated with the scale

"excellent", "good", "satisfactory", "bad", indicating the percentage of positive, negative and physiological. The total examination time is 60 seconds. During the testing process, the test subject's psychophysiological reaction is recorded using a web camera installed on the computer, and micro-movements of the head are processed using vibraimage technology [6]. For statistical processing of the obtained results for the sample, the Stat1_60 computer program package was used.

Results of the study and discussion. In order to solve this problem, a study was carried out on the PFS of active qualified athletes, gamers and biathletes at rest. The results of testing of qualified athletes are presented in table 1.

Analysis of the results presented in table 1 indicates that qualified gaming athletes differ from qualified biathletes in terms of aggressiveness, charisma, energy and self-regulation.

According to the developers of the VibraMed10 program [4, P. 53], high indicators of the state of aggressiveness must be analyzed taking into account the average frequency of the vibraimage. Analysis of the state of aggressiveness based on the characteristics of the variability of parameter changes allows us to conclude that gaming athletes are in a state of active concentration when undergoing the examination.

Biathletes showed high levels of balance, charisma and self-regulation. The parameters inhibition and neuroticism characterize the efficiency of physiological processes.

Analysis of the results presented in table 2 confirms the identified dynamics of the studied indicators. Biathletes with the growth of sports skills have the greatest difference in the parameters of poise and self-regulation, charisma. There is a tendency to increase the average values and reduce the variability of the parameter balance and self-regulation.

The conclusion about the dominance of these parameters in their psychophysiological state allows us to state that the growth of professional skills among biathletes over many years of training is accompanied by directional dynamics of the indicated PPS indicators.

Analysis of the results in table 3 confirms the dynamics of the studied indicators among gamers, identified earlier [1, 3].

Highly qualified gaming athletes differ in four parameters that characterize states: aggressiveness, charisma, energy and self-regulation. There is a tendency for average values to increase and variability to decrease. The conclusion about the dominance of the indicators of aggressiveness, charisma, energy and self-regulation in their psychophysiological state allows us to state that the growth of professional skills among gaming athletes over many years of training is accompanied by the directional dynamics of these PPS indicators.

Conclusions. It has been established that the indicators of aggressiveness, charisma, energy and self-regulation are decisive in the characteristics of high-level gaming athletes. These conditions are significant in the dynamics of the growth of their sports skills. It was revealed that among qualified biathletes, their psychophysiological state is dominated by indicators of balance and self-regulation, with subordination of the parameters of inhibition and neuroticism. The

Table 1. *Results of psychophysiological testing by the VibraMed10 program of qualified gaming athletes and biathletes*

Indicators	M±S		Vi (S/M)	
	Sports games (n=14)	Biathlon (n=14)	Sports games	Biathlon
Aggressiveness	37,99±5,90	34,36±7,09	16,14	20,51
Stress	32,67±3,25	42,71±3,97	10,29	9,14
Anxiety	32,47±7,86	36,87±6,89	26,64	18,98
Danger	34,33±3,91	37,41±4,00	11,58	10,70
Equilibrium	64,89±7,62	69,35±6,10	12,44	8,85
Charismatic	71,80±5,50	56,09±7,04	7,98	14,61
Energy	19,70±3,44	16,50±3,38	17,75	20,49
Self-regulation	68,06±5,45	62,36±5,72	8,28	9,53
Braking	16,13±2,72	14,81±1,91	16,39	12,80
Neuroticism	27,19±9,87	19,07±6,87	36,15	35,61

Note: M – average value of the parameter for a given period of time; S – standard deviation of the parameter; Vi – variability of parameter changes.

Table 2. *Results of psychophysiological testing by the VibraMed program of 10 biathletes with the ranks of Candidate Master of Sports, Master of Sports*

Indicators	M±S		Vi (S/M)	
	CMS (n=7)	MS (n=7)	CMS	MS
Aggressiveness	35,46±7,54	34,00±6,95	21,00	20,34
Stress	46,83±3,11	41,34±4,25	6,64	9,97
Anxiety	36,17±6,89	37,10±6,90	19,04	18,96
Danger	38,77±3,65	36,96±4,11	9,43	11,13
Equilibrium	67,01±6,28	70,13±6,04	9,44	8,66
Charismatic	55,00±4,70	56,46±7,82	8,55	16,64
Energy	16,89±3,85	16,38±3,22	19,59	3,28
Self-regulation	60,20±4,95	63,09±5,97	9,96	8,23
Braking	15,04±1,59	14,74±2,01	10,55	13,55
Neuroticism	15,87±4,89	20,14±7,53	30,81	37,21

Table 3. *Results of psychophysiological testing by the VibraMed program of 10 gaming athletes with the ranks of Candidate Master of Sports and Masters of Sports.*

Indicators	M± S		Vi (S/M)	
	CMS (n=7)	MS (n=7)	CMS	MS
Aggressiveness	37,09±6,28	38,37±5,74	18,19	15,26
Stress	37,77±2,74	30,48±3,47	7,20	11,61
Anxiety	34,94±7,14	31,41±8,17	20,55	29,25
Danger	36,90±3,82	33,24±3,94	10,48	12,05
Equilibrium	61,27±7,52	66,45±7,67	12,60	12,38
Charismatic	65,55±8,03	74,48±4,41	12,64	5,99
Energy	17,41±3,30	20,69±3,50	19,83	16,86
Self-regulation	62,52±6,63	70,43±4,94	10,89	7,16
Braking	15,19±2,20	16,54±2,94	14,40	17,25
Neuroticism	22,02±7,80	29,40±10,75	36,23	36,11

growth of professional skills of biathletes is accompanied by directional dynamics of the indicated PPS indicators.

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Assessment of tolerance to psychophysical load in students of a special medical group during nordic walking classes

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Abstract

Objective of the study was to assess tolerance to psychophysical stress in students of a special medical group based on indicators of the functional state of the cardiovascular system and subjective assessment on the pain scale.

Methods and structure of the study. A training program based on Nordic walking was developed, 12 sessions were conducted, during which tolerance to psychophysical stress was monitored by tracking objective and subjective indicators. The study involved 126 people, of which 76 girls and 50 boys, all belonging to the third health group (A), the average age at the time of the study was 18.2 years.

Results and conclusions. The results obtained indicate that adaptation to psychophysical stress among SMG students is positive if organizational, methodological and medical-biological factors are observed, including monitoring the functional state of the cardiovascular system in the form of pedagogical control and psycho-emotional background through assessment on a behavioral pain scale.

Keywords: *tolerance to psychophysical stress, students of a special medical group, physical education at the university.*

Introduction. The problem of a widespread decline in health levels is observed in all regions of Russia and is currently very relevant. By the time they enter university, 12-17% of students have deviations in their health, and the tendency for it to worsen by the end of their studies is also an alarming circumstance [2]. In the educational space of the university, various conditions are created for students with poor health. In particular, as part of the educational process, a special medical group is being formed, classes with which are designed to solve the problems of improving indicators of the functional and psycho-emotional state, increasing conditioning, expanding the capabilities of aerobic endurance and physical performance.

Nordic walking is a generally recognized means of improving health; its positive effect has been shown in numerous studies and is recommended as a recreational and rehabilitation tool for people of all ages, including students [1, 3].

At the same time, questions related to the methodological aspects of organizing Nordic walking classes with students of a special medical group, taking into account the prevention of complications of the underlying disease or the manifestation of secondary disorders, are open for study. First of all, it is important to take into account the dosage of loads in the lesson, their methodologically competent differentiation and variation. In this context, it is appropriate to consider the term “psychophysical stress” as a set of psychological (emotional overtones of the activity, spirit of competition, expectation of encouragement in the form of praise, etc.) and physiological (direct impact on the cardiovascular, respiratory and other systems) effects on the body of those involved, caused in response to motor activity. The magnitude of psychophysical stress is determined by two sides, the first “external” is associated with the volume and intensity of motor activity, with the strength of its emotional coloring, while the second, “internal” is associated with the reaction of the body, mainly oxygen transport systems.

Considering the fact that students of a special medical group have persistent health problems, and in physical education classes it is important to ensure

a rehabilitation, health-improving and at the same time training effect, there is a need to study tolerance to psychophysical stress. Thus, physical activity stops when the first signs of an inadequate reaction of the respiratory and cardiovascular systems appear, as well as a subjective expression of the inability to continue.

The importance of studying tolerance to psychophysical stress is determined by the determinants of organizational, methodological, medical and biological support for physical education classes with students of a special medical group:

1. Implementation of the principles of individualization and differentiation in the context of psychophysical stress, ensuring the safety of pedagogical influences;

2. Providing urgent control based on monitoring the current state with specific quantitative indicators of the volume and duration of psychophysical stress;

3. Formation of sustainable motivation among students of a special medical group to improve their health, awareness of the patterns of psychophysiological processes.

Objective of the study was to assess tolerance to psychophysical stress in students of a special medical group based on indicators of the functional state of the cardiovascular system and subjective assessment on the pain scale.

Methods and structure of the study. In order to assess the tolerance to psychophysical stress of SMG students based on objective and subjective indicators, a training program based on Nordic walking was developed and tested. It was implemented over 6 weeks (12 lessons), 126 1-3 year students took part in the study, of which 76 girls and 50 boys, all belonging to health group III (A). The analysis of indicators was carried out based on the following methods:

- ✓ heart rate reaction values (normal – pulse 40-50% of the original);
- ✓ behavioral pain scale [Behavioral Pain Scale (BPS)] (norm 3-5 points, load reduction 6-7 points, load cessation 7-10 points).

Results of the study and discussion. Content analysis of publications of the last 5 years by domestic and foreign authors made it possible to find out that as rehabilitation and recreation for SMG students in physical education classes, it is necessary to use aerobic types of motor activity of medium and low intensity of psychophysical load, such as: walking, including Nordic walking, light jogging followed by walking. And if the level of objective and subjective tolerance is exceeded, restore indicators through the use of breathing and relaxation exercises. Thus, as a result of the obtained content analysis data, our own pedagogical observations and experience, a training program using Nordic walking was created, which was implemented in three stages:

At the first stage, over 2 weeks (4 lessons), a gradual involvement in the training process was carried out, this included:

1. Teaching the Nordic walking technique for 1st year students or repeating it for 2nd-3rd year students.

2. Adaptation of oxygen transport systems: respiratory and cardiovascular to psychophysical stress.

3. Expanding the body's capabilities in terms of aerobic endurance and physical performance.

At the second stage, over the course of 3 weeks (6 lessons), the following problems were solved:

1. Optimization of Nordic walking technique, combination of pace and rhythm with individual capabilities and general health, including subjective well-being.

2. A gradual and maximum possible, taking into account tolerance to psychophysical stress, increase in the "price of adaptation" based on varying its volume and/or intensity during the lesson.

3. Creation of favorable conditions for the development of moral and volitional qualities of the individual on the foundation of humanely oriented pedagogical support for students.

At the third stage, during the 1st week (2 sessions), the goal was realized: to assess the capabilities of aerobic endurance and physical performance based on the "Nordic walking" test, 40 minutes, with an average speed of 4-4.6 km/h.

At all three stages, the current state of the body was monitored based on objective and subjective indicators of tolerance to psychophysical stress: 4-5 measurements of heart rate and blood pressure within 60 minutes and collection of feedback on the pain scale as necessary.

Average values of indicators assessing tolerance to psychophysical stress

Stages	1st stage "retracting"	2nd stage "training"	3rd stage "evaluation"
Increase in heart rate from the initial value (in%)	40,5±12,9	36,8±9,8	29±8,7
Maximum heart rate response values (bpm)	148±23,1	141±13,5	135±21,7
Behavioral Pain Scale (BPS) (point)	6,7±2,4	4,5±2,1	2,3±1,8
Heart rate recovery (min)	7,2±1,2	4,3±1,5	3,8±1,1

The results of the study of tolerance to psychophysical stress in students of a special medical group are presented in the table.

As can be seen from the table, active adaptation to psychophysical stress occurs within 6 weeks, so its subjective and objective indicators stabilize and reach normotonic values by the end of the study.

Our research is consistent with the scientific data of the authors, confirming the high importance of using aerobic types of motor activity in physical education classes with SMG students in relation to the increase in indicators of the cardiorespiratory system [1, 3, 4]. So, in our study, there was a quantitative and qualitative adaptation of the cardiovascular system to psychophysical stress, which is expressed in an improvement in the reaction of adaptability to external and internal stressors.

Conclusions. Evolutionarily, adaptation mechanisms determine the ability of the human body to adapt to environmental stimuli. The study showed that a training program based on Nordic walking, taking into account subjective and objective indicators of tolerance to psychophysical stress of SMG students, implemented for 12 weeks, leads to improved functioning of the cardiovascular system and, therefore, helps to increase aerobic endurance and performance.

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Relationships between indicators of internal aggression and age categories of athletes. The problem of moral verbality in sports

UDC 316.614.5

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Abstract

Objective of the study was to determine the dominant aggressiveness of various age categories of athletes as an etymological factor of inappropriate behavior after the end of a sports career and a potential factor in their asocialization.

Methods and structure of the study. 36 former athletes (2 international masters of sports, 13 masters of sports, 12 candidates for master of sports, 9 first-class athletes) of various age categories took part in the scientific work. Based on a questionnaire survey (questionnaire by L.G. Pochebut), the magnitude of aggression was determined and its direction was assessed [3]. The results were divided into categories: verbal aggression (verbal hostility); physical (use of physical force); subject (using household items); emotional (alienation with elements of hostility). The presence of connections between age categories of athletes and types of aggression was revealed based on the correlation coefficient of bivariate descriptive statistics for a quantitative measure of interaction [5].

Results and conclusions. Based on the data obtained, a hypothesis was formulated about the cause-and-effect relationship between the age of former and current athletes and physical and verbal aggression. No statistically significant connections were found between the age of athletes and emotional and objective aggression.

To compensate for the effect of the factor of verbal aggression in the process of socialization of active athletes, the authors proposed a method of socio-psychological mentoring, which is based on coaching pedagogical cultivation of positive verbality and control over the acquisition of positive social experience.

Keywords: *types of aggression, age categories of athletes, asocialization of athletes.*

Introduction. Sports activity is the most active social phenomenon. In addition to victories and achievements, it solves a number of vitally important specific issues. One of the main ones is the education of a young person's personality for full integration into the social system [2]. The solution to the educational problem is carried out through the direct interaction of all participants in training and competitive activities. The mutual exchange of semantic information enriches athletes with norms of behavior, verbal expressions and mutually binding connections [4].

Taking into account the law of normal distribution, the process of socialization in sports cannot be treated unambiguously only from the positive side. The main motivation for all sports activities is the long-term goal: "to be stronger and faster than your opponents at all costs." The incentive to action in this case, as a rule, does not have the power of suggestion without intense emotions and "strong" expressions of mentors. Long-term experience of such motivation does not so much generate a positive effect in the socialization of athletes, but exposes them to the danger of taking the path of psychological destruction [7]. This is facilitated by the unconscious adoption of negative roles and attitudes, which can lead to personality deformation in relation to generally accepted social norms. Moreover, antisocial experience is an event extended over time. It is closely related to the age periods of human development and is the cause of irreversible phenomena under the influence of the phenomenon of psychody-

namic transfer [2]. The unconscious transfer of emotions previously experienced in sports into subsequent life can distort the attitude towards professional and personal reality after the end of a career. The likelihood of mental discomfort with deviant tendencies, which often manifest themselves in aggressive behavior, increases. Thus, deviation in the form of aggression, as a type of psychological dominant, indicates an internal conflict between personal beliefs and external requirements, between one's desire and external obligation.

The relevance of studying the causes of aggression in athletes and its relationship with age increases if this information helps to create a system for protecting young people from the influence of psychological determinants of professional destruction during training and competitive activities [5].

Objective of the study was to determine the dominant aggressiveness of various age categories of athletes as a potential factor in their asocialization.

Research objectives:

1. Determine the values of the components of aggressiveness and assess the degree of their relationship with the age categories of the population under study.

2. Identify the determinant of aggressive manifestations of former and current athletes as a cause of social destruction.

3. Justify the use of the method of socio-psychological mentoring of young athletes to gain positive social experience.

Methods and structure of the study. Based on a review of literary sources, a hypothesis was formulated that the instrumental aggression of athletes is the cause of social destruction [2, 4, 7]. Determining the features of this process, in our opinion, will make it possible to identify those methods of psychological support that will increase the effectiveness of the socialization of young people for a fruitful life after their career.

A study was conducted to confirm the hypothesis. The study involved 36 former athletes of various age categories: 21-30 years old; 31-40 years old; 41-50 years old; 51-60 years and over 60 years. The contingent of subjects was represented by two masters of sports of international class, thirteen masters of sports, twelve candidates for master of sports and nine athletes of the first category. The values of aggression were determined based on a questionnaire survey. In addition to the magnitude, its direction was assessed. Data were obtained using a questionnaire from L.G. Pochebut [3]. Four scales allowed the distribution of results into categories: verbal aggression (verbal hostility); physical (use of physical force); subject (using household items); emotional (alienation with elements of hostility).

The hypothesis of a relationship between the age variables of former athletes and aggression was tested based on the correlation coefficient of bivariate descriptive statistics for a quantitative measure of interaction [5, 6].

Results of the study and discussion. As a result of the correlation analysis of the survey data, some patterns were identified, which are presented in the table.

The closeness of correlations between types of aggression and the age of athletes

Types of aggression	Correlation coefficient with age
Verbal	0,60
Physical	-0,88
Emotional	0,24
Subject	-0,04

Of the four types of aggression, only physical and verbal have a relationship with the age of athletes. A negative, very strong connection was found (r=-0.88) between the factor ("age of athletes") and performance characteristics ("physical aggression"). At the same time, a direct moderate connection was revealed between indicators of verbal aggression and the age of athletes (r = 0.6).

According to the results of the correlation analysis, no statistically significant connections between the age of former and current athletes and emotional and objective aggression were found.

Based on the obtained data from the correlation analysis, it is possible to formulate a hypothesis about the cause-and-effect relationship between the age of athletes with physical and verbal aggression, excluding emotional and objective ones. After a career ends, physical aggression decreases over the years, while verbal aggression increases. Thus, verbal-logical (verbal) thinking in the process of sports activity is most likely a psychological determinant of professional destruction. It is the "word", as a means of expressing negative thoughts, that creates the necessary conditions for the formation of behavioral stereotypes with elements of aggression. Insults, abuse, shouting, threats and the like are the beginning and basis of social destruction. The initiative of negative verbalization

can be implemented during the interaction of a coach with a student, in a group of athletes, as well as in the competitive struggle of opponents at competitions. It should be noted that if verbal aggression is the root cause of social destruction, then words with positive content can become the beginning and basis for positive socialization.

Conclusions. 1. Of all four types of aggression studied, only physical and verbal have a relationship with the age of athletes. Physical aggression decreases with age, while verbal aggression increases.

2. The dominance of verbal aggression during sports activities and the increase in its manifestations with the age of athletes, in contrast to other types of aggression, suggests that it is the main cause of social destruction.

3. Insults, swearing, shouting, threats and the like activate and provoke physical, emotional, as well as objective aggression.

4. Words with negative content are the beginning and basis of social destruction. Words with a positive focus create conditions for positive socialization of athletes.

5. The solution to the problem of socialization of athletes depends on the educational initiative of the coach, who has the authority to limit negative and cultivate positive verbality, as well as enrich athletes with speech patterns with positive content.

6. The development and practical application of verbal ethics for all participants in sports activities will eliminate instrumental aggression as a factor in victory over an opponent and will allow identifying the strongest, fastest and most technical athletes without using psychological pressure.

7. If we realize the educational potential of sport and form positive verbal language of a highly moral nature among millions of athletes in the country, then their active life position will have a healing effect on the speech state of our youth. Conversely, thousands of former athletes who are accustomed to verbal aggression can cause degradation of the verbal skills of young people in modern society.

Practical recommendations. To resolve the issue of positive socialization of young athletes, it is necessary to create an educational structure of verbal ethics for all participants in sports activities. This requires a training program, which should be based on the foundation of the best examples of Russian literature, and also filled with positive affirmative statements for various situations of training and competitive activity. The degree of mastery of verbal ethics can serve as a marker for assessing the professional suitability of a coach as an educator of young athletes with a view to their full integration into the social system.

If the destructive influence of aggressive verbality in modern sports cannot be ruled out, then it is necessary to organize a separate sports space in which the potential of all subjects and means of influence will be realized in order to positively socialize young athletes who do not perceive “harsh expressions” in the process of coaching leadership and interaction with partners. team. This will increase the popularity of sports activities, since the alternative sphere of sports will include people whose inner world is based on the principles of highly moral verbality.

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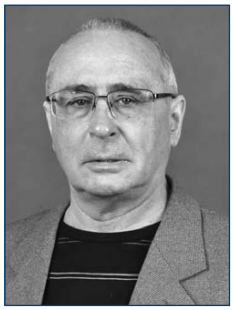
Influence of karate training lessons on functional parameters of the heart in first-year students

UDC 796/799



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Abstract

Objective of the study was to monitor the impact of regular karate training on the heart characteristics of first-year students.

Methods and structure of the study. 15 male first-year students who had experience in karate training for at least six months 3 times a week were examined. The comparison group consisted of 16 clinically healthy, physically untrained first-year boys. Ultrasound diagnostics of the heart condition were carried out. The Student's t-test value was calculated.

Results and conclusions. Those who began to practice karate had a tendency to develop hypertrophy of the left ventricular myocardium, which consisted in an increase in its mass and the development of its walls. The external size of the left ventricle and the volume of its cavity in karatekas remained normal. In addition, they showed a slightly higher rate of myocardial relaxation than in the comparison group. It is clear that karate training for six months strengthens the myocardium of the left ventricle, maintaining the optimum of its internal volume, external dimensions and functionality.

Keywords: *first-year students, heart, myocardium, left ventricle, karate, sports.*

Introduction. Strong muscular loads, experienced regularly as part of any sport, form a number of positive changes in the body [10], which are clearly adaptive in nature [2]. Provided that systematic physical activity is dosed, a lot of positive metabolic, neuroendocrine and bioenergetic changes develop in the musculoskeletal, nervous and cardiovascular systems [9]. Regular physical activity most clearly affects heart parameters, adapting the body to their frequent repetition [11].

It becomes clear that physical training systems in any sport lead to a number of changes in the morphofunctional characteristics of the heart [5, 8]. The differences here may have a certain scientific significance and can help build a holistic picture about the characteristics of the impact of different durations of various types of sports on the heart [12].

The importance of the parameters of the functioning of vital organs for obtaining maximum sports results requires continued clarification of their main characteristics in athletes of different specializations [8]. Clarification of the upcoming morphofunctional changes in various internal organs in those who have recently started regular sports training remains of great importance [1].

Objective of the study was to evaluate the impact of regular karate training on the heart characteristics of first-year students.

Methods and structure of the study. The observed group included 15 young men studying full-time in their first year at the university and training in the karate section for the last six months three times a week.

The comparison group recruited for the study consisted of 16 clinically healthy freshman boys who had low physical fitness and did not engage in sports.

In the work, the morphofunctional parameters of the heart were determined using an ultrasound device SSD-80, "Aloka" (Japan). Based on the results of the study, Student's t-test was calculated.

Results of the study and discussion. As a result of the assessment of the main morphofunctional parameters of the heart in the observed patients, differences were noted between the observation groups under consideration for the left heart sections (see table).

The diameter of the left atrium in karatekas had a slight tendency to exceed (by 2.2%) this value in the comparison group. The left ventricular diameter in the anterior-posterior projection during diastole tended to be 2.3% higher in trainees than in physically inactive young men. The rate of contraction of the anterior-posterior diameter of the left ventricle had a slight tendency to be higher in beginner karatekas than in the comparison group (by 5.6%). In young athletes, the diastolic wall thickness of the left ventricle in the posterior part tended to exceed this parameter in the comparison group by 7.4%. The value of the final diastolic volume of their hearts had a slight tendency to be inferior to that of physically untrained young men (by 3.1%), with the values of stroke volume being similar in both observed groups.

In beginning karatekas, the myocardial mass was 9.5% higher than in the boys in the comparison group. There is no doubt that this was a consequence of working hypertrophic changes in the heart of the young men against the backdrop of six months of regular karate training. A small degree of myocardial hypertrophy in young karatekas did not affect the value of cardiac output, which maintained optimal hemodynamics in them.

The highest rate of myocardial relaxation in the region of the posterior left ventricular wall is rightly considered as a significant indicator reflecting the reserves of the heart muscle. Systematic training in the karate section led to its increase by 14.3% compared to that in the control group.

In beginner karatekas and their physically inactive peers, the external and internal volumes of the left ventricle were comparable. This was accompanied by comparable characteristics of myocardial contractile capabilities in both groups.

The work carried out gave reason to believe that regular training in the karate section leads to the appearance of adaptive hypertrophy phenomena in the walls of the left ventricle. This was proven by the thickening of its walls and an increase in its mass while maintaining the optimum of its capacity and external dimensions [7].

The high rate of diastolic relaxation of the left ventricle in the posterior wall region found in beginning karatekas can be regarded as an important marker of a high level of physical fitness [3]. This indicator in the control group was inferior to that in the group of young karatekas, confirming that even not very long training in the sports section can have a positive effect on the functional parameters of the heart [4].

Conclusions. Karate classes for six months have a positive effect on the heart parameters of first-year students. Beginning young karatekas are characterized by a slight increase in the mass of the left ventricle while maintaining the optimum of its contractile abilities and normal capacity.

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Characteristics of a karateka's heart

Heartfelt indicators	Karatekas, M±m, n=15	Control, M±m, n=16
Left ventricular diastolic posterior wall thickness, cm	1,16±0,32	1,08±0,19
The value of the final diastolic volume, cm^3/kg	1,92±0,18	1,98±0,15
The value of the impact volume, cm^3/kg	1,10±0,15	1,08±0,06
The diameter of the left atrium, cm/m^2	1,85±0,23	1,81±0,31
Diastolic size of the left ventricle in anteroposterior projection, cm	5,22±0,33	5,10±0,29
Contraction of the left ventricle in the anteroposterior projection, %	36,0±0,53	34,1±0,67
Myocardial mass, cm^3/kg	2,41±0,46	2,20±0,38; p<0,05
Maximum rate of relaxation of the posterior wall of the left ventricle, cm/s	12,0±0,86	10,5±0,75; p<0,05
Ejection fraction percentage, %	63,4±1,56	60,7±0,98

Note: p – existing differences between the groups of first-year students under consideration.

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Correction of the torso position of female sprinter athletes based on changes in postural balance

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Abstract

Objective of the study was to provide a methodological substantiation of the effect of postural balance on the correction of the body position of an athlete when covering a distance.

Methods and structure of the study. Generalization and interpretation of established axioms in the training of female sprinters justified the need to conduct a pedagogical experiment using the proposed methodology, the basis of which was adapted means from fitness programs using a Bosu platform for the development of postural balance and functional TRX loops for strengthening stabilizer muscles.

Results and conclusions. The effectiveness of the technique was confirmed by statistically significant differences in the results of running 60 m before and after the experiment. It has been established that exercises on TRX loops, a bosu platform and a fitball contribute to the development of coordination abilities and the ability to control the body in space, both in a supported and unsupported position. Positive dynamics of statokinetic indicators in female sprinters was achieved through targeted improvement of postural balance and increasing the strength potential of the muscles that ensure the maintenance of static and dynamic balance.

Keywords: *sprinters, postural balance, stabilizer muscles, center of body mass, supporting function of the foot.*

Introduction. Sprint is considered one of the most dynamic and spectacular disciplines in athletics, requiring rational running technique and the development of speed qualities. Sprinting includes running at a distance from 30 m to 400 m. Sprint running along a distance includes 4 phases: start, starting run-up, running along a distance and finish. The result is recorded at the moment of touching the imaginary finish plane with any part of the body, excluding the head, neck, arms and legs [2]. In the preparation of a sprinter, the leading place is occupied by the development of a controlled position of the torso when shifting the overall center of body mass (OCBM) in each phase of movement, which contributes to the technical economization of the athlete's movements [5, 7, 9]. To maintain balance and strengthen the trunk muscles, the targeted use of variable fitness programs is relevant [4, 6, 8].

During the study of special scientific literature and pedagogical observation of the educational and training process of highly qualified athletes, it was established that the physical training of sprinters is focused only on the development of leg muscles and speed abilities. Insufficient attention is paid to body position control during distance running. This approach also negatively affects the training results of track and field sprinters.

Objective of the study was a methodological substantiation of the effect of postural balance on the correction of the body position when female athletes cover the sprint distance.

Methods and structure of the study. The study used a meta-analysis of information in the field of fitness and sprinting.

Generalization and interpretation of established axioms in the training of female sprinters justified the need to conduct a pedagogical experiment using the proposed methodology, the basis of which was adapted means from fitness programs using a Bosu platform for the development of postural balance and TRX functional loops for strengthening stabilizer muscles [1, 3].

The study was carried out on the basis of pedagogical observation and analysis of the training process of qualified female sprinters of the I-KMS category (n=18), who trained 3 times a week according to the proposed methodology for six months.

Training corrections involve a targeted change in methodological approaches and resource functionality of the training process under the influence of external and internal factors that determine the direction, nature and depth of the impact of training technologies. In this regard, emphasis has been placed on fitness programs that increase the dynamic and static strength of the trunk muscles.

The proposed complexes included exercises selected taking into account the largest number of muscle groups covered in the work, performed in various modes (dynamic, static and statodynamic):

- to develop the supporting function of the feet, contributing to the maintenance and management of the overall center of body mass;

- to maintain balance on a solid support, on a limited support (beam, one leg), on an unstable one (bosu platform, fitball, balance disc);

- to strengthen the torso muscles that provide left and right rotation (turn), the flexor and extensor muscles of the torso, using a fitball;

- to improve the interaction of superficial and deep muscles, aimed at optimizing muscle tone using TRX loops (one-arm row at an angle with body rotation; lifting the buttocks in the side plank);

- to develop flexibility and increase elasticity of the whole body with the help of TRX loops.

When performing the complexes, the athletes adhered to the specified characteristics: number of repetitions and series, load intensity, rest pauses. Variable methods of sports training were used (alternating, repeated, interval, circular).

Results of the study and discussion. Testing at the end of the experiment determined the nature of the relationships between the rate of increase in results in general physical and special exercises and made it possible to assess the representativeness of the use of adapted fitness programs in the process of training female sprinters.

A comparative analysis of the development of speed-strength and coordination abilities of female athletes before and after the end of the experiment is presented in the table.

Before the experiment, the athletes showed the following results in the long jump: standing – 237.6±16.9 m, back forward – 132.6±34.0 m, with a 180° turn to the right and left 175.3±39.6 m and 170.5±36.3 m, respectively, which indicates a low level of control in space. During initial testing, the running time for 30 m from the move was 3.61 ± 0.26 s, from the start – 4.67 ± 0.39 s; at 60 m – 8.04±0.18 s. In tests assessing the ability of female sprinters to maintain balance on an unstable support, the results were average: maintaining balance in a stance

Dynamics of physical fitness indicators of track and field athletes, $\bar{X}\pm m$

Tests		Before	After	t
Long jump, cm	from place	237,6±16,9	250,1±39,4	2,2
	backwards	132,6±34,0	144,6±5*	4,4
	with 180° rotation (to the right)	175,3±39,6	196,5±26,7*	1,7
	with 180° rotation (left)	170,5±36,3	188,4±42,6*	3,7
30 m run, s	from the start	4,67±0,39	4,43±0,23	2,4
	on the move	3,61±0,26	3,46±0,33	4,3
60 m run, s	from the start	8,04±0,18	7,51±0,23	3,1
Stand on one leg on a bosu platform, s	on the right	46,8±11,7	72,8±7,6*	3,1
	on the left	41,4±9,3	68,3±8,2*	3,7
Kneeling on an unstable support (fitball), s		53,4±5,7	96,6±4,9*	4,8

*Note: * – level of significance of differences at $p \le 0.05$.*

on the right and left leg on a bosu platform - 46.8 ± 11.7 s and 41.4 ± 9.3 s, respectively, and in a kneeling position on a fitball – 53.4±5.7.

After the pedagogical experiment, the results improved in all control exercises. The increase in results in percentage terms is most significant in the long jump with a turn of 180˚ to the right and left - 10.7% and 9.57%, respectively, and in tests for maintaining static balance on an unstable support: in a standing position on the right leg - 36.1 %, in a standing position on the left – 39.7%, in a standing position on the knees – 44.8%.

Based on the results of the pedagogical experiment, it was found that the standard cyclic movement of a sprinter depends on the control of body position while running along a distance. A stable working posture was formed as a result of the development of the ability to maintain static and dynamic balance.

The effectiveness of this technique was confirmed by statistically significant differences ($p \leq 0.05$) in the results of running 60 m before and after the experiment; the time improved from the start by 0.53 s, the increase was 7.1%.

Test results indicate the effectiveness of the methodology for developing postural balance using adapted fitness program tools. Positive dynamics of statokinetic indicators was achieved through targeted improvement of the proprioceptive system and increasing the strength potential of the muscles that maintain balance.

Conclusions. During the pedagogical study, it was established that the main task of postural control is to maintain the position of the torso during movement and restore balance when exposed to external factors. The versatility and effectiveness of the method for correcting the torso position of female sprinters lies in the focus of training on TRX loops, a bosu platform and a fitball to work on stabilizer muscles that contribute to the development of coordination abilities and skills of body control in space in a supported and unsupported position.

Adapted fitness program tools help create a powerful foundation for the safe and high-quality development of sports running technique.

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Features of the vital capacity of the lungs in athletes engaged in underwater apnea

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Abstract

Objective of the study was to assess the vital capacity of the lungs of athletes involved in underwater apnea among women and men of the highest sports skill.

Methods and structure of the study. Submarine athletes aged from 22 to 28 years (30 women and 30 men) took part in the experiment. All athletes were conditionally divided into three groups of 20 people (10 women and 10 men): group A – athletes specializing in underwater apnea, group B – athletes specializing in stayer distances, group C – athletes specializing in sprint distances. Each athlete studied has specialized in this discipline of underwater sports for at least five years, is a member of the national team of the Krasnoyarsk Territory and has a sports title of at least candidate master of sports.

Results and conclusions. The conducted research allows us to summarize that women and men involved in underwater sports and performing in the apnea discipline have high VC rates. Intense training regimes of highly qualified athletes in cyclic sports place increased demands on the external respiration apparatus, and scuba diving is precisely the sport where the cardiorespiratory system plays a significant role.

Keywords: *submarine swimmers, apnea, training process, morphofunctional characteristics, sports specialization, vital capacity, sports discipline, external respiration apparatus.*

Introduction. Scuba diving is a rapidly growing sport. The basis of scuba diving is the athlete diving and swimming across the surface of the water for a certain length in the shortest time while wearing a monofin. Also, underwater sports are characterized by diving underwater using special equipment, devices, apparatus and equipment [1, 3].

Literary data on the health status of submarine athletes and people involved in scuba diving are very scarce, which is due to the relative youth of this sport. Nevertheless, the results of research in this area make it possible to generally characterize the level of development of morphofunctional indicators of this contingent of athletes. The greatest interest was shown in the study of the function of external respiration - one of the most loaded systems in submarine swimmers [4]. Numerous studies have shown that diving athletes, due to systematic diving under water, had an increase in the vital capacity of the lungs (VC), an increase in the possible duration of stay under water during diving, an increased tolerance to hypoxia, and the ability to maintain normal blood oxygen saturation for a long time during apnea [2, 5, 6]. However, there is very little scientific literature and studies of vital capacity indicators in submarine athletes specializing in the discipline of apnea, which served as the topic of our study.

Objective of the study was to assess the vital capacity of the lungs of athletes involved in underwater apnea among women and men of the highest sports skill.

Methods and structure of the study. Submarine athletes aged from 22 to 28 years (30 women and 30 men) took part in the experiment. All athletes were conditionally divided into three groups of 20 people (10 women and 10 men): group A – athletes specializing in underwater apnea, group B – athletes specializing in stayer distances, group C – athletes specializing in sprint distances. Each athlete studied has specialized in this discipline of underwater sports for at least five years, is a member of the national team of the Krasnoyarsk Territory and has a sports title of at least candidate master of sports. The following methods were used in the work: the method of assessing morphofunctional indi-

cators, the method of mathematical statistics. The vital capacity of the lungs was determined using a special device - a spirometer. The study was conducted in the morning, before training. The athletes were in a vertical position when exhaling maximally into the spirometer, using only one attempt. The method of mathematical statistics was used to establish the relationship and substantiate the results obtained. During the study, a correlation analysis of the relationship between sports performance and the level of development of the vital capacity of the lungs was carried out.

Results of the study and discussion. Sports training helps to increase the functional capabilities of the body, and they largely ensure the achievement of high sports results. With proper construction of the training process, taking into account individual anthropometric indicators, the reserve capabilities of the body increase, increasing its biological stability and system reliability. Studying the functional state of the external respiration apparatus is an important indicator in the training of an athlete.

The average VC at rest in female underwater swimmers specializing in underwater apnea (group A), sprinting (group C) and stayer (group B) disciplines are presented in table 1, men in table 2.

Table 1. Average VC at rest among female underwater swimmers specializing in underwater apnea, sprint and stayer disciplines

group A	group B	group C
4900 мл^3	4400 мл^3	3800 мл^3

Table 2. Average VC at rest among male underwater swimmers specializing in underwater apnea, sprint and stayer disciplines

group A	group B	group C
6700 мл^3	5400 мл^3	4900 мл^3

Analyzing the vital parameters of apnoic athletes, one can note the fact that these indicators are significantly higher than those of stayers and sprinters, which in turn indicates the high functionality of the respiratory apparatus. Intense training regimes of highly qualified athletes in cyclic sports place increased demands on the external respiration apparatus, and scuba diving is precisely the sport where the cardiorespiratory system plays a significant role.

In order to determine the extent to which apneic athletes need to develop their respiratory apparatus, a correlation analysis was carried out of the relationship between the sports result (diving while holding the breath for the maximum number of meters) and the level of development of the vital capacity of the lungs. The analysis revealed a close correlation between the studied parameters in women specializing in underwater apnea (r=0.79). At the same time, among men the correlation coefficient was higher (r=0.83).

Conclusions. The study allows us to summarize that athletes specializing in underwater apnea have a larger lung volume than athletes specializing in stayer and sprint distances, both among men and women. This can be explained by the specifics of swimming underwater while holding your breath, where special requirements are placed on the work of a submariner in anaerobic conditions (the ability to hold your breath when diving to a length of 50 m or more).

The high correlation between sports performance and parameters of the vital capacity of the lungs in women indicates the need to develop the respiratory apparatus for apnoic athletes.

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Modern fitness technologies and their impact on population health

UDC 796.011

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Abstract

Objective of the study was to determine contraindications to the most popular areas of fitness and to identify the validity of the stated results of such techniques as bodyflex and crossfit.

Methods and structure of the study. Theoretical substantiation of practical research experience, analysis of scientific and methodological literature (comparisons, analogies, induction).

Results and conclusions. An analysis of modern trends in fitness is presented, contraindications to certain types of physical activity are indicated. Contradictions between individual hypotheses and the scientific substantiation of the impact on those involved in such sports as bodyflex and crossfit were revealed. Due to insufficient knowledge of the influence of modern trends in fitness on the body of those involved, a recommendation is made for a professional attitude towards little-studied techniques.

Keywords: *modern trends in fitness, contraindications to exercise, crossfit, bodyflex, effectiveness of the impact.*

Introduction. One of the positive trends of recent times should be called the desire of the population to maintain health, including through physical education. Fitness, as the most popular type of physical education activity, has taken on the task of attracting the maximum number of people to physical exercise [10]. The modern fitness industry, responding according to the basic law of the market, has offered the population a variety of products, according to the request. However, not all of the proposed technologies have a scientific basis, both in terms of health safety and their effectiveness in terms of their impact on the development of motor qualities.

Objective of the study was to determine contraindications to the most popular areas of fitness and to identify the validity of the stated results of such techniques as bodyflex and crossfit.

Methods and structure of the study. Theoretical substantiation of practical research experience, analysis of scientific and methodological literature (comparisons, analogies, induction).

Results of the study and discussion. Traditional swimming classes and sports games offered in fitness centers should be classified as well-studied, from a scientific point of view, types, in contrast to modern trends. The most popular of them are the following: aerobics in water, various types of *oriental dance, flex classes, step aerobics, fit-bo, ki-bo, kick-boxing, ultimate fighting, Pilates, bodyflex; strength fitness areas: super sculpting, Upper Body, Lower Body, crossfit.*

Research into such areas of fitness as step aerobics, Pilates, and aquafitness confirms their effectiveness both in the development of motor skills and in improving the health of the body of those involved. At the same time, some of the modern trends, due to the lack of a full-fledged scientific justification, raise serious concerns about the possible negative impact and dubious influence on the development of physical capabilities.

Thus, scientists' warnings about contraindications to breathing exercises for certain chronic diseases, glaucoma, intracranial pressure and heart disease do

not reduce their popularity, especially among older people [7, 9]. And, despite the presence of limitations, some authors recommend using breathing techniques, in particular Bodyflex, at any age and regardless of the presence of chronic diseases [12].

Diseases of the urinary and cardiovascular systems, being quite common, impose a ban on training in strength sports, which include such modern trends as *super sculpting, Upper Body, Lower Body, CrossFit* [4, 8].

Strength training, due to the heavy load on all body systems, is also contraindicated for diseases of the endocrine system, one of which is diabetes [3]. The same restrictions in exercise are imposed on people with diseases of the gastrointestinal tract: ulcers of the stomach and duodenum, pancreas, various forms of gastritis, diseases of the intestines, gall bladder and bile ducts.

Diseases and problems with vision, respiratory diseases and neuralgia on the eve of classes require consultation with a specialist due to restrictions on a fairly wide range of loads.

A clear contraindication to physical education and sports is a recent inflammatory or infectious disease, after which you should wait for the body to fully recover.

Of course, all existing restrictions in physical education do not mean a complete absence of physical activity: for each specific disease, appropriate rules and training regimens are selected, which is described in the relevant literature [3, 4, 8]. In addition, a mandatory consultation with your doctor will help you avoid the undesirable consequences of excessive stress. However, few of those involved follow this rule, and medical personnel and fitness center instructors approach this problem formally and do not always warn about the possible consequences of such activities; on the contrary, one can find a recommendation: "for any age and level of fitness," without indicating obvious contraindications. At the same time, the qualifications of instructors are sometimes so low that they are not able to assess the optimal load for those involved, and in group classes people are often left to their own devices and rely on dosage solely on their own feelings, without resorting to methods of self-monitoring and self-diagnosis.

As a survey of 55 people working out in fitness centers in St. Petersburg showed, only three people knew about contraindications to strength training, of which only one person was warned about this by the center's medical worker and another by the instructor. Of the remaining 52 people, 43 did not undergo a full medical examination at all, and nine were examined only by some specialists. 18 out of 52 had chronic diseases, without suspecting that exercise should be strictly dosed, and some exercises are generally contraindicated.

Another important point is the lack of fundamental research on the influence of modern fitness trends on the development of motor skills and the reduction of fat mass. Thus, the stated expected results from Bodyflex breathing exercises suggest a decrease in the fat mass of those involved, and as recommendations for the main exercises, the author puts forward the need to adhere to a daily routine, 4-5 balanced meals a day in small portions without fatty and fried foods with a predominance of vegetables and fruits at optimal the amount of water in the diet, which in itself can become a factor stimulating weight loss, and not breathing exercises [5].

The same can be said about CrossFit, a detailed examination of which from a scientific point of view casts doubt on the possibility of developing strength, speed, flexibility, endurance, and agility, which all well-known fitness centers promise in their advertising. The impossibility of such improvement is due to the CrossFit methodology itself: high-intensity exercises from different sports, performed without pauses for recovery, from a scientific point of view cannot develop either speed, agility, or general endurance. As for strength, an increase in the development of this quality, according to V.M. Zatsiorsky and modern authors, is possible only with significant muscular efforts, the magnitude of which is individual, while crossfit group training cannot take into account such features. In addition, V.M. Zatsiorsky warns that adaptation to significant muscle tension can lead to a decrease in strength, even when training with large weights, but less than the weight that is usually used.

In addition to the dubious benefits in the development of motor skills, CrossFit can cause significant harm to health, since it is widely used when working with different contingents. So yes. Kuraeva recommends this method as a means of general physical development of children [6], and E.L. Belova introduces CrossFit into the practice of working with primary schoolchildren [2] despite the fact that strength endurance exercises, which form the basis of the CrossFit methodology, involve repeated repetition of straining, which causes "cessation of blood flow in the loaded muscles and oxygen starvation of the brain" [11, p. 276]. Such exercises cannot be carried out not only with preschoolers and primary schoolchildren, but also with people of mature and elderly age [1].

As an analysis of publications by other authors shows, many studies do not take into account contraindications to certain areas of fitness.

Workers in the fitness industry are no exception in this regard. A survey of 25 instructors at fitness centers in St. Petersburg with basic physical education in accordance with Order of the Ministry of Labor of Russia No. 950n dated December 24, 2020, showed that only three people studied scientific literature in order to obtain information about ways to improve physical qualities using modern fitness equipment. technologies; six out of 25 approximately know what contraindications exist when engaging in certain types of fitness, the rest believe that physical exercise cannot have contraindications provided that the participants are in good health.

Conclusions. Based on the above, we can state the following: the market for the provided fitness services is diverse, while the need for physical education among the population is quite high. However, the level of training of specialists, despite the availability of basic physical education, is insufficient, and the degree of professional awareness of the population about the possible impact of certain exercises on the development of motor skills and health is low.

Taking this into account, the problem of advanced training and retraining of personnel for this field of activity, awareness of the population about the usefulness of modern fitness techniques is becoming urgent. Scientists publishing the results of their research should treat the published materials with full responsibility in order to prevent the spread of false information regarding some modern trends in fitness.

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Organizational and pedagogical model of formation of physical culture of the country's population: theoretical aspect

UDC 796.0011

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Abstract

Objective of the study was to substantiate and develop a theoretical model for the formation of physical culture of the country's population and test it in practice.

Methods and structure of the study. The main research methods in the work were: analysis of scientific and methodological literature on the topic of research, survey, questioning, structuring, systematization, modeling, comparison, graphic analysis, abstraction, interpretation, etc. The system of functioning of physical culture and sports among the population in the Krasnoyarsk Territory was also analyzed. All this as a whole made it possible to adjust and formulate a theoretical model for the formation of physical culture of the population of the Krasnoyarsk Territory, which, after testing, can be designed for all regions of the country.

Results and conclusions. An analysis of scientific and methodological literature and a number of sociological studies of physical education and sports of the country's population showed the following dynamics: in 2019, 40% of the country's population (58.6 million people) were engaged in physical culture and sports, in 2023 – 53% (70 million people), by 2030 it is planned to increase the number of students to 70% (93 million people). In order to achieve the above indicators, it is necessary to improve the system of physical education and recreational work among the population of the country, namely, to design its content to develop in people a culture of physical culture and sports, and the need for systematic physical exercise.

Keywords: *physical culture, population, formation, organizational and pedagogical model, stages.*

Introduction. At the International Forum "Russia – a Sports Power", which was held in October 2023 in Perm, the President of Russia set a task for the Government of the country about the need to attract at least 70% of the state's population to mass physical education and sports. This important task can be solved if the country has developed and operates a comprehensive system for the formation of physical culture among the population, starting with preschool children and ending with the older generation.

The need to form a holistic and stage-by-stage organizational and pedagogical model of the formation of physical culture of the population, starting from preschool age and progressively covering the older generation of people and to control the formation of physical culture involved in the means of GTO, was the goal of this theoretical study. All of the above will contribute to the formation and establishment of a system for introducing the country's population to mass physical education and sports and developing their need for systematic physical exercise.

Objective of the study was to substantiate and develop a theoretical model for the formation of physical culture of the country's population and test it in practice.

Methods and structure of the study. The main research methods in the work were: analysis of scientific and methodological literature on the topic

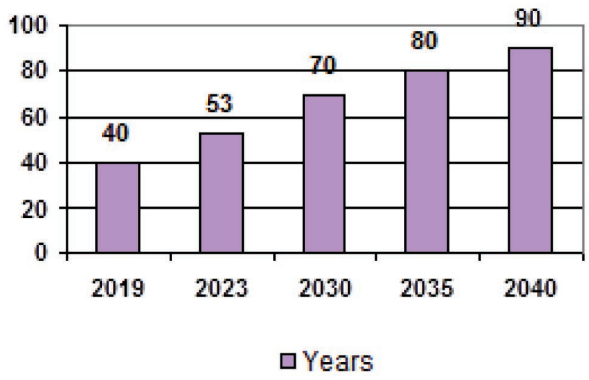

Figure 1. Dynamics of the country's population engaging in physical culture and sports, in %

of research, survey, questioning, structuring, systematization, modeling, comparison, graphic analysis, abstraction, interpretation, etc. The system of functioning of physical culture and sports among the population in the Krasnoyarsk Territory was also analyzed. All this as a whole made it possible to adjust and formulate a theoretical model for the formation of physical culture of the population of the Krasnoyarsk Territory, which, after testing, can be designed for all regions of the country.

Results of the study and discussion. Human physical culture is, first of all, a formed need for systematic physical education and sports, aimed at strengthening health, developing and maintaining physical abilities in the process of all life activities. The need for systematic physical exercise, obtaining "muscular pleasure" is a basic component of physical culture.

At the heart of the theoretical organizational and pedagogical model is the basic goal aimed at developing the physical culture of the country's population and the need for systematic physical exercise. An analysis of scientific and methodological literature and a number of sociological studies of physi-

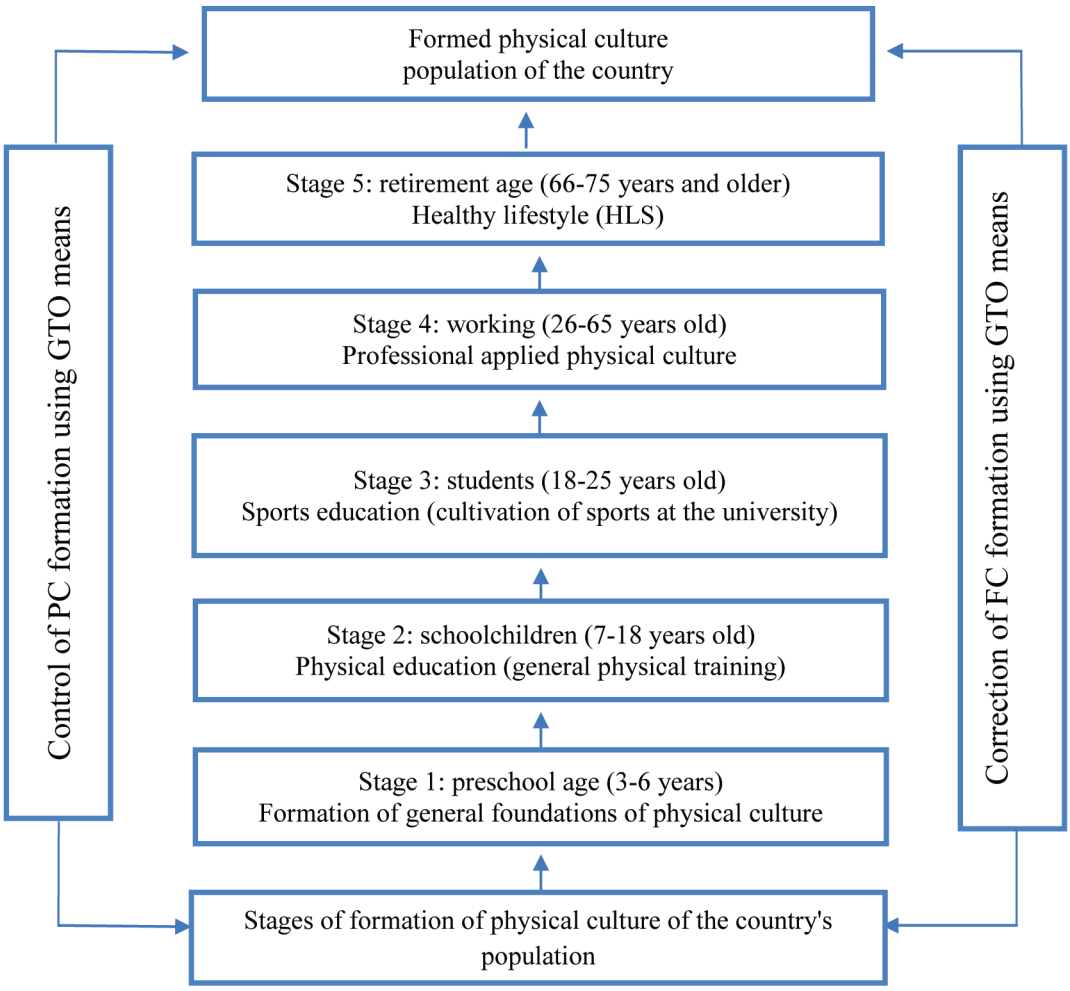

Figure 2. Organizational and pedagogical model of the formation of physical culture of the country's population

cal education and sports of the country's population showed the following dynamics: in 2019, 40% of the country's population (58.6 million people) were engaged in physical culture and sports, in 2023 – 53% (70 million people), by 2030 it is planned to increase the number of students to 70% (93 million people).

Figure 1 shows a graphical display of the dynamics of physical education and sports activities of the country's population.

At the International Forum "Russia – a Sports Power", the President of Russia declared 2024 the year of sports. In order to achieve the above indicators, it is necessary to improve the system of physical education and recreational work among the population of the country, namely, to design its content to develop in people a culture of physical culture and sports, and the need for systematic physical exercise. In this target setting, a theoretical model of the formation of physical culture (PC) of the country's population was developed.

The organizational model for the formation of physical culture of the country's population, presented in Figure 2, includes 5 stages that progressively form the necessary theoretical knowledge and practical skills in physical culture and sports throughout a person's life.

Conclusions. The generated theoretical model includes five main stages of human life, where at the first stage, general physical education is formed in preschool children; at the second stage, schoolchildren develop basic physical qualities; at the third stage at student age - inculcation of various sports (sports culture); at the fourth stage, the working population is supported with applied motor skills and abilities necessary in work; at the fifth stage, the older generation engages in a healthy lifestyle and prolongs their longevity. Such a systematic approach will contribute to the solution of all physical education and sports goals that the state and society plan to be a sports and healthy nation.

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Increasing the efficiency of students' learning process at a university through physical education

UDC 796

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Abstract

Objective of the study was to develop and implement the main ways to increase the efficiency of the learning process of students at a university using physical education.

Methods and structure of the study. The experiment was conducted in the 2022/23 academic year. First-year students of the Russian State Hydrometeorological University (EG, n=12) and Saint Petersburg State University (CG, n=10) took part in the study. The authors analyzed the sanitary and hygienic conditions of training, professionally important qualities, as well as information about the physical activity of students. Research results. As a result of generalization and analysis of the data obtained, it was found that not only a properly organized educational process, but also a complex of health and hygiene measures, as well as sufficient physical activity of students, plays an important role in increasing the efficiency of the learning process of students at a university. Regular physical education classes in conditions of intense educational activity are an accessible and effective means of preventing mental and psychophysiological fatigue, which increases the effectiveness of learning.

Results and conclusions. As a result of generalization and analysis of the data obtained, the dynamics of individual indicators of the hygienic conditions of student learning were established. Semester, weekly and daily changes in these indicators were obtained, however, only the daily dynamics of temperature and relative air humidity, as the most influential on the condition and performance of students, can be classified as natural. Regular physical education classes in conditions of intense educational activity are an accessible and effective means of preventing mental and psychophysiological fatigue, which increases the effectiveness of learning.

Keywords: *students, fitness technologies, professional performance, physical activity, efficiency.*

Introduction. Modern rapidly changing economic conditions, progress in science and technology, the growing demand for nanotechnology and the introduction of artificial intelligence increase the requirements for the competitiveness of a future specialist, which dictates the need to modernize the content of educational programs [1, 3, 7]. This issue is especially acute when mastering technical training programs. Thus, the educational process for preparing bachelors in the direction 03.03.02 - "Physics" is currently characterized by very high requirements for the professional performance of students, which are constantly updated and increasing, which is expressed in an increase in the share, volume and intensity of mental work of students. The success of students in mastering the educational program is determined by the level of their performance, expressed in scores on exams and tests. Modernization of the educational process should be carried out in parallel with the introduction of a set of measures that ensure a corresponding increase in the professional performance of students. Therefore, it is necessary to pay special attention to the regularity and completeness of students' physical activity, which contributes to the ability to maintain good physical shape. Physical education classes, having an impact on the psycho-emotional state, influencing the

thinking and memory of those involved, improve the results of mastering the educational program [3, 7].

Objective of the study was to develop and implement the main ways to increase the efficiency of the learning process of students at a university using physical education.

Methods and structure of the study. The experiment was carried out from September 2022 to May 2023. 22 first-year students took part in it. The experimental group (EG) consisted of 12 first-year students of the Faculty of Information Systems and Geotechnologies of the Russian State Hydrometeorological University, and the control group (CG) included 10 students of the Faculty of Physics of St. Petersburg State University. Representatives of the EG and CG are mastering the bachelor's training program in the direction 03.02.02 - "Physics".

During the 2022/2023 academic year, an analysis was carried out of sanitary and hygienic conditions (temperature and relative humidity), professionally important qualities (memory (short-term for words and numbers, operational and long-term for words), thinking (speed of mental operations), processing speed visual information and reactive anxiety), as well as information about motor activity.

Information on all studied indicators was obtained weekly (to establish the dynamics of each during the semester), daily (during the week) and several times a day (to establish daily dynamics). The experimental material was processed using the methods of mathematical statistics.

Results of the study and discussion. In order to study the pattern that determines the manifestation of performance in the process of students mastering professional knowledge, skills and abilities, an installation experiment was conducted for 8 weeks in the fall semester of the 2022/2023 academic year. As a result of generalization and analysis of the data obtained, the dynamics of individual indicators of the hygienic conditions of student learning were established. Semester, weekly and daily changes in these indicators were obtained, however, only the daily dynamics of temperature and relative air humidity, as the most influential on the condition and performance of students, can be classified as natural (Figure 1). As can be seen in Figures 2–4, relatively higher rates of professionally important qualities among students are grouped during the first two pairs of classes in the daily mode and in the middle of the week - in the weekly dynamics: a relatively better state of long-term memory and speed of thinking is noted on Wednesday and Thursday, and speed of visual information processing – on Tuesday and Wednesday. No such periods were established during the semester, and no reliably regular relationships were found between these indicators. Figure 5 clearly confirms the relationship between mental performance and physical activity in weekly dynamics. Thus, not only a properly organized educational process, but also a set of health-improving and hygienic measures (reasonable organization of diet, work and rest, etc.), as well as sufficient physical activity, play an important role in increasing the efficiency of the student learning process at a university.

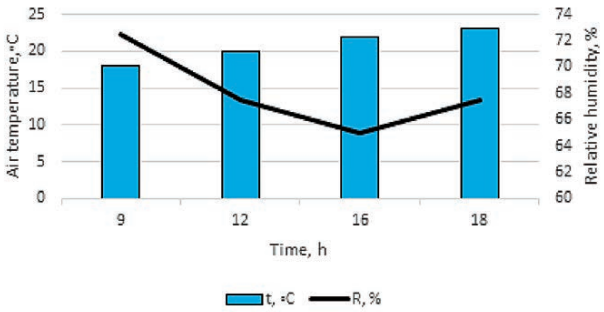

Figure 1. Changes in temperature and relative humidity

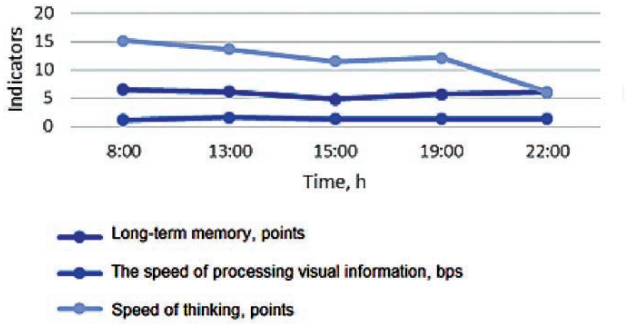

Figure 2. Dynamics of psychophysiological indicators in students per day

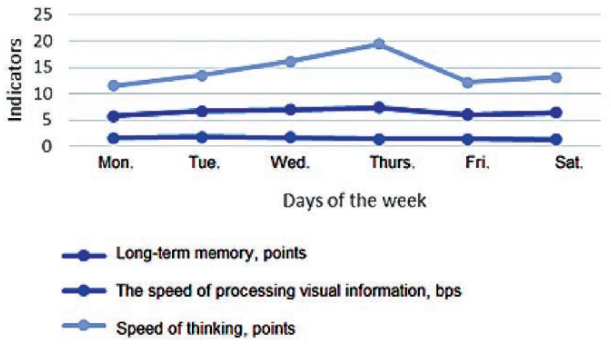

Figure 3. Dynamics of psychophysiological indicators among students over a week

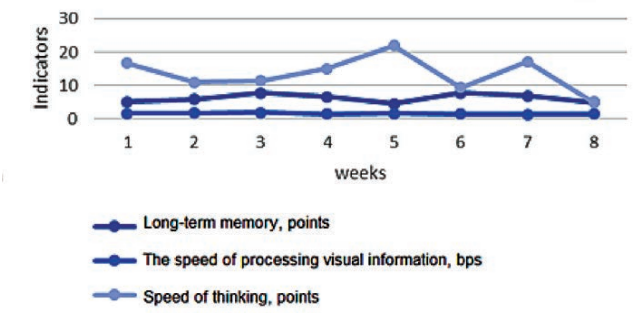

Figure 4. Dynamics of psychophysiological indicators among students during the fall semester

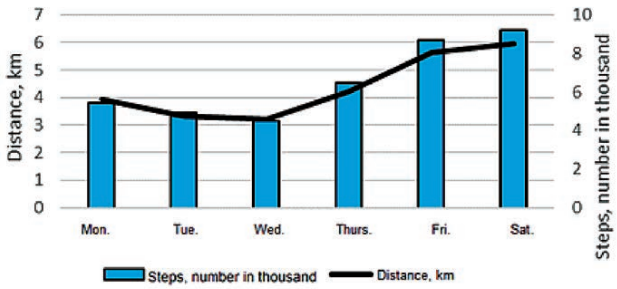

Figure 5. Dynamics of physical activity of students per week

With the assistance of the educational and methodological department of the Russian State Hydrometeorological University, within the framework of mastering the discipline "Elective courses in physical culture and sports" in the spring semester, the students of the EG were agreed upon a study schedule that took into account the experimental data obtained, so the fourth pair was assigned for physical education classes. Mondays and Wednesdays, and on Friday an additional lesson was organized for them in the format of a section by teachers of the Department of Physical Education and Life Safety. The CG studied without making changes to the schedule (Saturday - fourth pair) and the content of the discipline curriculum.

Based on the research experience of a number of authors, modern fitness technologies were chosen for classes with EG [4, 6,]. Tokareva A.V. et al., in their studies, experimentally confirmed that "aerobic exercises are one of the effective means of improving the mental performance of students" [5]. Therefore, to increase both physical and mental performance, on Monday the main emphasis was placed on the development of aerobic endurance, on Friday - on the development and strengthening of the muscular corset of those involved, while Wednesday, as the most effective and at the same time, busy day in terms of mental performance, was devoted to less energy-consuming types - fitness yoga and stretching or joint gymnastics. It must be emphasized that regular yoga classes contribute to the formation of a state of alertness and the development of coordination of movements, improvement of posture and level of physical fitness, and also allow maximum concentration, concentration and calmness [2, 7].

The results of the study after 10 weeks of study in the spring semester are presented in tables 1, 2. Properly organized and rationally selected physical activity contributed to more effective learning. During the survey, students subjectively noted that regular classes allowed them to tone up their body or relax, depending on their workload, time and day during the week, also 80% noted that they began to get sick less often, and 95% did not miss a single day couples due to fatigue. When examining in detail the results of a study of psychophysiological indicators in students per day and per week, one should note the uniformity and sufficient stability of their distribution.

Table 1. Dynamics of psychophysiological indicators in students per day (before - average indicators of both groups, and after the study - separately in the EG and CG)

Indicators/time		8:00	13:00	15:00	19:00
Long-term memory, points	Before	6,5	6,2	4,8	5,7
	EG	6,6	6,5	6,2	5,9
	CG	6,3	6,0	5,1	5,2
The speed of processing visual information, bps	Before	1,2	1,6	1,4	1,4
	EG	1,6	1,7	1,6	1,6
	CG	1,1	1,6	1,2	1,3
Speed of thinking, points	Before	15,2	13,7	11,5	12,2
	EG	16,1	16,5	16,2	14,7
	CG	13,5	12,8	12,2	9,1

Table 2. Dynamics of psychophysiological indicators in students over a week (before - average indicators of both groups, and after the study - separately in the EG and CG)

Indicators/time		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Long-term memory, points	Before	5,7	6,7	7	7,4	6	6,4
	EG	6,4	7,1	7,3	7,2	6,8	6,8
	CG	5,3	5,2	6,4	5,7	6	6,6
The speed of processing visual information, bps	Before	1,6	1,8	1,7	1,4	1,4	1,3
	EG	1,8	1,9	1,9	1,8	1,7	1,7
	CG	1,2	1,3	1,6	1,2	1,1	1,1
Speed of thinking, points	Before	11,5	13,5	16,1	19,5	12,2	13,1
	EG	15,7	15,9	16,1	16,4	16,1	15,7
	CG	13,5	14,1	15,7	13,5	12,4	10,9

There were no significant changes in the CG, but due to the incorrect distribution of the study load during the week and the inability to compensate for mental fatigue with physical activity, there was a decrease in attendance and, accordingly, academic performance in the study group.

Conclusions. Based on the study, the main ways to increase the efficiency of the student learning process at the university were identified, this made it possible to develop, together with the educational and methodological department of the university, recommendations for scheduling and content of physical education classes, taking into account the characteristics of the daily and weekly dynamics of performance indicators and physical condition of students. Regular physical education classes in conditions of intense educational activity are an accessible and effective means of preventing mental and psychophysiological fatigue, which increases the effectiveness of learning.

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Formation of professional sports culture of the personality of cadets of educational organizations of the federal penitentiary service of Russia in the aspect of methodological approaches

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Abstract

Objective of the study was to theoretically substantiate the conceptual apparatus and methodological foundations of the formation of professional sports culture of the personality of cadets of educational organizations of the Federal Penitentiary Service of Russia.

Methodology and organization of the study. The work applies a theoretical analysis of scientific works of various authors, extrapolates and formulates the concept of professional sports culture of personality of cadets.

Results and conclusions. The concept of professional sports culture of the individual is clarified, a comparative analysis is carried out with such concepts as: physical culture of the individual, applied physical training, sports culture of the individual. Conceptual provisions for the formation of a professional sports culture of an individual have been developed.

Keywords: *professional sports culture of personality (PSCP), determinants, concept, conceptual apparatus.*

Introduction. To improve the quality of physical training of cadets of educational institutions of the Federal Penitentiary Service of Russia, various methodological approaches are used [3]. One of the promising approaches to increasing the level of physical fitness is the formation of a professional sports culture of the personality (PSCP) of cadets, this will increase the level of motivation for sports training, which will lead to an increase in the number of cadets regularly involved in sports and, as a result, an increase in the level of their physical fitness [4].

Objective of the study was to theoretically substantiate the conceptual apparatus and methodological foundations of the formation of professional sports culture of the personality of cadets of educational organizations of the Federal Penitentiary Service of Russia.

Methodology and organization of the study. The work applied a theoretical analysis of scientific works of various authors, carried out extrapolation and formulated the concept of PSCP of cadets.

Results of the study and discussion. Professional sports culture of an individual is part of a person's culture, personal education that determines a positive attitude towards sports training and sports. In the professional aspect, this phenomenon is expressed in the use of sports training to achieve high levels of psychophysical readiness for service, a high level of development of physical qualities and perfect mastery of professionally important motor skills.

The professional sports culture of an individual is closely related to the essential characteristics of physical culture, professionally applied physical training,

and sports culture. According to famous scientists L.P. Matveeva and A.D. Novikov, in a broad sense, the physical culture of an individual is the results of the use of material and spiritual values embodied in human activity that relate to the sphere of physical culture [8]. While V.M. Vydrin includes in the concept of physical culture of an individual everything that a person has used and achieved beyond what nature has given him [2]. In this context, V.K. Balsevich defines the physical culture of an individual as the totality of a person's personal physical motor achievements (physical qualities, motor skills, performance, etc.) [1]. Based on the stated positions, it should be noted that PSCP differs from the physical culture of an individual in its sports orientation. Vocational applied physical training is a specially organized educational process aimed at developing the psychophysical readiness for professional activities of future specialists, using special means of physical activity [6]. In our opinion, an important feature of PSCP is that it is a personal cultural quality, expressed in a positive attitude towards sports activities, and not only as a result of physical training. This thesis is confirmed by the opinion of V.I. Stolyarov and S.Yu. Barinov, who consider personal sports culture (SCP) as values, socio-pedagogical processes and relationships developed in society and passed on from generation to generation that develop during competitions and sports preparation for them [7]. In addition to this position, we will present the point of view of K.B. Tumarov in the understanding of sports culture as a holistic, systemically organized and personally determined characteristic of a person - a subject of sports activity [9]. Summarizing various approaches to understanding the essence of sports culture of the personality of L.I. Lubyshev and A.I. Zagrevskaya substantiate this phenomenon as an integrative personal education, including a system of means, methods and results of physical culture and sports activities, aimed

Conceptual provisions for the formation of professional sports culture of the personality of cadets of educational organizations of the Federal Penitentiary Service of Russia

Main blocks	Contents of blocks
Target	Theoretical-methodological and methodological-technological support for the process of formation of PSCP of cadets
Tasks	Improving the quality of the pedagogical process; Improving interaction between participants in the educational process; Formation of motivation for cadets to carry out sports activities. Development of sports infrastructure and increasing its accessibility for sports training by cadets
Methodological approaches	Axiological, environmental, systemic, competency-based, cultural, these are the approaches that make it possible to fully form PSCP
Patterns	Physical training of cadets of educational institutions of the FPS of Russia should be of a professional and applied nature; Unity of general and special physical training; The physical training of cadets is as versatile as possible in the general physical training section; Physical training should consist of the following sections: theoretical training, general physical training and special physical training, which includes combat techniques, overcoming obstacle courses
Determinants of the concept	Social order, domestic and international pedagogical experience, the changing functionality of a modern worker, practical experience in carrying out teaching activities
Methodological basis for constructing the concept	Content analysis, theoretical and methodological analysis, pedagogical extrapolation, pedagogical modeling
Legal basis	"The Constitution of the Russian Federation" (adopted by popular vote on 12/12/1993 with amendments approved during the all-Russian vote on 07/01/2020); Federal Law "On Education in the Russian Federation" dated December 29, 2012 N 273-FZ (latest edition); Federal Law "On Higher and Postgraduate Professional Education" dated August 22, 1996 N 125-FZ (latest edition); Federal Law of July 19, 2018 N 197-FZ "On service in the penal system of the Russian Federation" and on amendments to the Law of the Russian Federation "On institutions and bodies executing criminal penalties in the form of imprisonment", Order of the Federal Penitentiary Service of Russia dated 06/13/2023 N 382 "On approval of the Procedure for organizing personnel training to fill positions in the penal system of the Russian Federation" (Registered with the Ministry of Justice of Russia on 07/13/2023 N 74247) and the federal state educational standard
Prerequisites for constructing the concept	Theoretical; Socio-historical; Practical.

at the perception, reproduction, creation and dissemination of physical culture and sports values and technologies [5]. Professional sports culture of the individual is a related concept of sports culture of the individual, however, unlike it, it has a pronounced professional orientation.

The conducted theoretical research raised the question of the need to formulate the main provisions of the concept of the formation of PSCP of cadets (see table).

Conclusions. Professional sports culture of an individual should be considered as an independent concept that characterizes the level of formation of professionally significant, physical and personal qualities of a specialist. At the same time, this phenomenon is an indicator of the effectiveness of the physical training process in a professional educational institution. The presented conceptual provisions for the formation of a professional sports culture of an individual determine the relevance of the transformation of methodological approaches in the physical training of law enforcement specialists.

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Indicators of time perception among students in special correctional and general education schools

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Abstract

Objective of the study was to determine indicators of time perception in 10-year-old children studying in correctional and general education schools.

Methods and structure of the study. The examination involved 78 healthy primary schoolchildren (boys 10 years old) and 34 of their peers suffering from sensorineural hearing loss (III-IV degree). We used the computer program "Researcher of Temporal and Spatial Properties of Humans." The "Individual Minute" (IM) test was used to reproduce the duration of the time interval.

Results and conclusions. In healthy schoolchildren and in students with auditory deprivation, different numbers of children with a shortened IM, a long IM and a normal IM were noted. There are significant differences in the studied groups of children with shortened IM. No differences in indicators were recorded when reproducing the duration of a time interval with a light pulse.

Keywords: *time perception, 10-year-old students, auditory deprivation.*

Introduction. Currently, one of the significant tasks of teaching in primary school is to create conditions for the development in the cognitive sphere of individual typological characteristics, which include the spatio-temporal orientation of students.

According to N.V. Davidenko (2007) "…spatio-temporal orientation is an action represented by a complex of operations (perceptual, motor, mental) aimed at identifying and operating with spatio-temporal features of the surrounding reality…".

The overwhelming number of natural movements that we make are spatially oriented, aimed at achieving a specific point in space. At the same time, researchers are attracted to questions of the organization of movements in time [9].

So, even in the work of E.I. Boyko (1964) noted that reaction time is determined by the factor on which component of the movement attention is focused on - sensory or motor. Studying the perception of short time intervals, Yu.V. Bushov et al. (2004) indicated the organization of two foci of integration (in the fronto-central and parieto-occipital areas of the cortex).

Subsequent studies showed that the best regulation of the functioning of a biological system is ensured exclusively through its temporal organization ("sense of time") [5, 6].

According to Yu.V. Koryagina (2010), an important criterion for the body's adaptation to various environmental conditions is the chronobiological features of time perception. In this case, a significant role in the apparatus of time orientation is played by the conditioned reflex timing of time intervals. It should be noted that in addition to the innate sense of time, there is also the possibility of a conscious assessment of time [8].

Thus, the level of motor activity has a certain influence on the accuracy of time perception; the higher it is, the more "correct" the perception and the authen-

ticity of the perception of behavior dynamics in the "fast-slow" range increases.

Thus, the formation of temporary representations is a condition for effective cognition and proactive interaction with the surrounding reality. This is especially true for children with auditory deprivation. The problem of developing temporary education is one of the cardinal ones for existing educational programs for students in correctional schools.

Objective of the study was to determine indicators of time perception in 10-year-old children studying in correctional and general education schools.

Methods and structure of the study. The experiment was carried out in the laboratory of the Department of Anatomy and Sports Medicine of the Kuban State University of Physical Culture, Sports and Tourism, at the Municipal Autonomous General Educational Institution gymnasium No. 18 and at a special correctional boarding school in Krasnodar.

The examination involved 78 healthy primary schoolchildren (boys 10 years old) and 34 of their peers suffering from sensorineural hearing loss (III-IV degree).

To implement the formulated goal, we used the computer program "Researcher of Temporal and Spatial Properties of Humans" [7].

Unfortunately, within the framework of one article it is technically difficult to display a complete complex showing the spatio-temporal characteristics of the subjects, so a fragment of the study was taken.

Before the examination began, the children were given instructions.

When determining the time range, the "Individual Minute" (IM) test was used. The subject pressed a laptop key at the beginning and end of the action and measured sixty seconds (interval). The result of the duration of an individual minute was set using a system timer based on the discrepancy between the beginning and end of the measurement.

A decrease in the duration of an individual minute is qualified as a sign of increased anxiety, emotional intensity, and tension in adaptation mechanisms. An increase in the individual minute indicates the advantage of inhibitory processes in the central nervous system, and fatigue develops.

When reproducing the duration of a time interval for memorizing a light stimulus lasting 1000 - 10,000 ms, which were displayed on the computer screen in random order. The student was asked to carry out the task by pressing keys on the keyboard. That is, the subject pressed the "space" key, remembering the amount of time of the stimulus that arose, and then reproduced it with the same key (at the beginning and end).

This study makes it possible to assess the perception of time and the "correctness" of time orientation, etc.

Methods of mathematical analysis. The experimental data obtained during the study were processed using standard mathematical and static methods on IBM compatible computers [3]. In this case, the following values were calculated: arithmetic mean value (M); average error of the arithmetic mean (±m); standard deviation (±σ). Differences in arithmetic means obtained in the study were determined using Student's t-test. A five percent significance level was considered significant. The study also used the statistical method of one-way analysis of variance.

The students took part on a voluntary basis; informed consent was obtained from parents and representatives of the children.

Results of the study and discussion. The conducted studies showed (Figure 1) that in healthy schoolchildren and students with auditory deprivation, in percentage terms, there are different numbers of children with shortened IM, extended IM and normal MI.

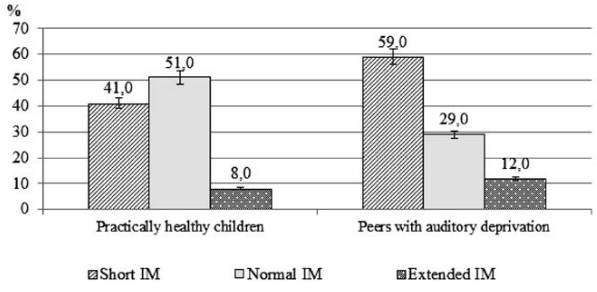

Figure 1. *Distribution of schoolchildren by definition of time intervals (individual minute, %)*

Table 1. *Average IM values in practically healthy children and those suffering from auditory deprivation (s)*

Indicators	Shortened IM	Extended IM	Normal IM
Practically healthy children n – 78	50,8±1,7	67,1±1,9	59,6±2,4
Children suffering from auditory deprivation n – 34	43,6±2,3	69,2±2,1	60,1±1,8
	p<0,01; r = 2,52	p>0,05; r = 0,74	p>0,05; r = 0,86

Note: p – reliability of differences in indicators between practically healthy children and their peers suffering from auditory deprivation.

Table 2. *Parameters of errors when reproducing time intervals filled with a light stimulus (%) in the studied groups, M±m*

Indicators	Practically healthy children	Children suffering from auditory deprivation	p
Light stimulus	28,9 ±1,8	30,1±1,5	>0,05 r = 0.61

Note: p – reliability of differences in indicators between practically healthy children and their peers suffering from auditory deprivation.

As a comparative analysis of IM parameters showed (Table 1), there are significant differences among primary school students. They were registered only in groups of children with shortened IM.

It should be noted that the closest value of an individual minute to astronomical time was recorded in practically healthy students, due to the optimization of mechanisms that ensure the balanced functioning of a group of analyzers.

When implementing the task of reproducing the duration of a time interval filled with a light stimulus, no differences in indicators were recorded between practically healthy children and their peers suffering from auditory deprivation (Table 2).

Conclusions. The duration of an individual minute can be considered as an adaptive criterion for the potential of a student in a general education organization.

The study was carried out within the framework of the Kuban Science Foundation grant No. PPN-21.1/27 "Vector of adaptation of the sensorimotor systems of children of the period of second childhood with varying degrees of auditory deprivation to educational physical education technologies".

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Influence of physical recreation of students with disabilities on indicators of their psychophysiological status

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Abstract

Objective of the study was to identify indicators of the psychophysical status of students with disabilities, which must be taken into account when designing and organizing physical recreation for students with health limitations and disabilities.

Methods and structure of the study. The scientific work was carried out at Vyatka State University using the psychomotor test module UPFT-1/30 "Psychophysiologist"; 14 students aged 17-22 years old with disabilities of different nosological groups and 14 students of the same age who did not have pathology took part in it. Based on the tests performed (tapping test, simple visual-motor reaction and reaction to a moving object), the functional state of the nervous system of the study population was assessed, and the level of reactive and personal anxiety was determined.

Results and conclusions. Indicators of the psychophysiological status of students with disabilities differ significantly from those of students without pathology in the leading hemisphere of the brain and the leading analyzer, in the level of activation of the nervous system and the level of personal anxiety. Taking into account the data we received, we developed a method of physical recreation with elements of rehabilitation for students with disabilities, and also formulated recommendations for its organization.

Keywords: *psychophysiological characteristics, students with disabilities, recreation, physical rehabilitation.*

Introduction. The realities of today are the increase in the number of students with health limitations and disabilities in educational institutions both in Russia and in the world.

A study of the adaptation features of students with disabilities showed the presence of problems in self-esteem and communication: they often define themselves as "neglected" [1]. According to international studies, among the important personal factors influencing the adaptation and performance of university students, self-awareness and self-determination, their self-esteem and performance were noted. Among external factors, students noted the influence of family, communication with teachers and fellow students [2]. Some of the problems with adaptation and communication of students with disabilities can be successfully solved by organizing physical recreation. An optimal organized mode of movement and control is an important condition for maintaining and developing health reserves, successful socialization of such students, and their physical improvement [3]. In studies by Pans et al. (2021) showed that the physical activity of students with disabilities at universities is below the WHO recommended level (150 minutes per week. The authors attribute such low activity of students to their lack of awareness of special sports programs for physical recreation, which are implemented taking into account their personal and social environmental factors [4].

The works of a number of authors describe isolated results of studying the psychological status of students with disabilities [5]. At the same time, taking into ac-

count the characteristics of the psychophysical status is necessary not only for the adequate organization of educational, but also extracurricular activities, recreation, and the organization of physical activity [6].

To determine approaches to organizing and creating a physical recreation program, it is necessary to know what characteristics of students with disabilities will affect its success.

Objective of the study was to identify indicators of the psychophysical status of students with disabilities, which must be taken into account when designing and organizing physical recreation for students with health limitations and disabilities.

Methods and structure of the study. The scientific work was attended by 14 students of both sexes with disabilities of different nosologies, studying in the 1st-3rd years of various profiles and 14 students without pathology, of the same age (18-21 years) and studying at the same faculties of Vyatka State University. At the same time, students with disabilities were considered the experimental group, and students without pathology were considered the control group. When conducting the study, theoretical (analysis of psychological and pedagogical literature, analysis, comparison) and empirical (comparative qualitative and quantitative analysis of the obtained data on psychophysiological status) methods were used.

The study of the psychophysiological characteristics of students in both groups was carried out using the psychophysiological testing device UPFT-1/30 "Psychophysiologist" twice before and after (1st measurement and 2nd measurement) the application of the rehabilitation methodology we developed. They were assessed for strength, mobility and balance of nervous processes using the tapping test sequentially, first with the right and then with the left hand [7]; the reaction time to visual and auditory stimuli (simple visual motor reaction (SVMR) and simple auditory motor reaction (SAMR)) was determined to assess the functional state of the central nervous system; we determined the level of reactive (situational) and personal anxiety using the Spielberger-Khanin test.

Statistical processing of the research results was carried out using the method of variation statistics using the Statistica programs using the Mann-Whitney U test.

Results of the study and discussion. During the initial testing (1st measurement), the majority (about 80%) of students in both groups had a weak type of nervous system. According to the coefficient of functional asymmetry, right-handers were 7.14% among students with disabilities, and 42.86% among students in the control group ($p<0.05$, Table 1); no left-handers were identified in the study population. It has been shown that the majority of students with disabilities we studied have a mixed profile of asymmetry (92.86% have ambidexterity), which reduces the level of mobility of their nervous processes and mental functions,

Table 1. Percentage of students with disabilities and without pathology who have different indicators of psychophysiological status

Indicator	Level/ Grade	Students with disabilities		Students without pathology		p
		M	*m*	*M*	*m*	
Leading hand (%)	Right	7,14	6,88	42,86	13,23	<0,05
	Ambidexterity	92,86	6,88	57,14	13,23	<0,05
Level of central nervous system activation based on SVMR (%)	High	21,43	10,97	14,29	9,35	>0,05
	Average	50,00	13,36	85,71	9,35	<0,05
	Low	28,57	12,07	0,00	0,00	<0,05
Level of central nervous system activation based on SAMR (%)	High	35,71	12,81	50,00	13,36	>0,05
	Average	57,14	13,23	35,71	12,81	>0,05
	Low	7,14	6,88	14,29	9,35	>0,05
Lead Analyzer (%)	Auditory	46,15	13,83	28,57	12,07	>0,05
	Visual	7,69	7,39	57,14	13,23	<0,05
	not identified	46,15	13,83	14,29	9,35	>0,05
Reactive anxiety (%)	High	14,29	9,35	7,14	6,88	>0,05
	Optimal	85,71	9,35	92,86	6,88	>0,05
Personal anxiety (%)	High	71,43	12,07	28,57	12,07	<0,05
	Optimal	28,57	12,07	71,43	12,07	<0,05

Note: Differences are statistically distinguishable at $p<0.05$.

and also increases the time of sensorimotor reaction (243 ms versus 222 ms in the control group based on SVMR data).

Analysis of the level and stability of human sensorimotor reactions in response to light and auditory stimuli showed that students with disabilities have a better developed reaction to auditory stimuli than to visual ones (46.15±13.83% versus 7.69±7.39%, $p<0.05$, Table 1), while such a dependence was not revealed among students in the control group. Based on a simple visual-motor reaction, significantly more students with disabilities had a low level of central nervous system activation (28.57±12.04% versus 0%, $p<0.05$, Table 1). As a result, they may be characterized by slow reactions with average stability values, a predominance of inhibition processes, inertia of nervous processes, and reduced functionality.

Among the students we studied, the majority (85.71±9.35% and 92.86±6.88%) had optimal values of the level of reactive anxiety at the time of the examination, i.e. at the time of the examination they did not experience stress and were in the "comfort zone". However, among students with disabilities, a significantly larger percentage of respondents with a high level of personal anxiety was identified (71.43% versus 28.57%, $p<0.05$, Table 1).

Taking into account the data obtained, we developed a method of physical recreation with elements of rehabilitation for students with disabilities, and also formulated recommendations for its organization (Table 2).

The methodology was based on a system of physical recreation, consisting of three blocks, which was implemented taking into account an individual approach, the adaptive characteristics of the body and the type of physical recreation preferred by the student. A survey of students with disabilities revealed the preferences of the majority of respondents to engage in gymnastics (71.42%), swimming (85.71%), and sports games, including adaptive ones (78.57%).

Students with disabilities for 6 months, 2-3 times a week, studied according to the physical recreation method we developed, while students from the control group, who did not have pathologies, studied in a free mode, which was not evaluated by them. It should be noted that when organizing recreation and rehabilitation, the coach must perform the role of an individual consultant to monitor the functional state and health of the student.

Repeated testing (2nd measurement) showed that the type of nervous system, leading analyzer, leading hand and profile of interhemispheric dominance did not change in the tested students of both groups. The average values of sensorimotor reactions to light and auditory stimuli also did not change significantly. However, analysis of a simple visual-motor reaction showed that the percentage of students with disabilities who have a low level of central nervous system

Table 2. Methodological aspects of organizing physical recreation for students with disabilities

Block	Tasks	Methodological aspects
Preparatory	Studying the characteristics of the body's reactions to increased physical activity; increasing tolerance to physical activity; normalization of the ratio of excitation and inhibition in the nervous system; mastering sets of physical exercises taking into account the main and concomitant pathologies	General developmental exercises, breathing exercises of a static and dynamic nature. The use of sets of breathing exercises is due to the need to learn self-control over the frequency, depth, and rhythm of breathing. Classes are held 2 times a week for 45-60 minutes
Developmental	Increasing the level of performance of the cardiovascular and respiratory systems; development of conditioning abilities; exploring available sports, including the Paralympic sport Boccia	Cyclic exercises with a pronounced aerobic component; exercises in the pool in the form of aqua gymnastics and dosed swimming to enhance the work of the diaphragm, ease the work of the heart, reduce static muscle tension, promoting an anti-stress effect. Studying the Paralympic sport Boccia allows you to develop coordination abilities, stabilize the nervous system, and the existing competitive component helps maintain interest in physical recreation. Classes are held 2 times a week for 45-60 minutes
Basic	Increasing the level of development of strength abilities; training loads during the Paralympic sport of Boccia; involving students in a volunteer program for accompanying children involved in Boccia (or other game activities)	Swimming combined with the use of aqua simulators and resistance exercises (dumbbells). Training loads in Boccia classes are combined with competitive activity, providing an emotional component to the classes. Classes are held 2-3 times a week for 60-90 minutes, depending on individual capabilities

Table 3. Percentage of students with disabilities and without pathology who have different indicators of psychophysiological status

Indicator	Level/ Grade	Students with disabilities		Students without pathology		p
		M	*m*	*M*	*m*	
Level of central nervous system activation based on SVMR (%)	High	14,29	9,35	14,29	9,35	>0,05
	Average	78,57	10,97	85,71	9,35	>0,05
	Low	7,14	6,88	0,00	0,00	>0,05
Level of central nervous system activation based on SAMR (%)	High	46,15	13,83	50,00	13,36	>0,05
	Average	53,84	13,83	42,86	13,23	>0,05
	Low	0,00	0,00	7,14	6,88	>0,05
Reactive anxiety (%)	High	7,14	6,88	7,14	6,88	>0,05
	Optimal	92,86	6,88	92,86	6,88	>0,05
Personal anxiety (%)	High	35,71	12,81	35,71	12,81	>0,05
	Optimal	64,23	12,81	64,23	12,81	>0,05

Note: differences are statistically distinguishable at p<0.05.

Table 4. Percentage of students with disabilities who have different indicators of psychophysiological status before and after rehabilitation intervention

Indicator	Level/ Grade	1st measurement		2nd measurement		p
		M	*m*	*M*	*m*	
Level of central nervous system activation based on SVMR (%)	High	21,43	10,97	14,29	9,35	<0,05
	Average	50,00	13,36	78,57	10,97	<0,05
	Low	28,57	12,07	7,14	6,88	<0,05
Level of central nervous system activation based on SAMR (%)	High	35,71	12,81	46,15	13,83	>0,05
	Average	57,14	13,23	53,84	13,83	>0,05
	Low	7,14	6,88	0,00	0,00	>0,05
Reactive anxiety (%)	High	14,29	9,35	7,14	6,88	>0,05
	Optimal	85,71	9,35	92,86	6,88	>0,05
Personal anxiety (%)	High	71,43	12,07	35,71	12,81	<0,05
	Optimal	28,57	12,07	64,23	12,81	<0,05

Note: differences are statistically distinguishable at p<0.05.

activation decreased (28.57±12.04% at the 1st measurement versus 7.14%±6.88 at the 2nd measurement). Thus, the values of a simple visual motor reaction in students with disabilities approached those of students in the control group. Similar changes occurred with a simple auditory-motor reaction - 7.14% of respondents in the experimental group initially had a low level of central nervous system activation, but at the 2nd measurement no such changes were detected. At the same time, the percentage of students with a high level of central nervous system activation increased (35.71%±12.81 at the 1st measurement versus 46.15%±13.83 at the 2nd measurement, Table 3).

The study of reactive (situational) anxiety in the control and experimental groups at the end of the experiment did not reveal significant changes, i.e. The students felt comfortable in the testing situation. However, in the experimental group, the percentage of students with a high level of personal anxiety decreased by half (71.4% at the 1st measurement versus 35.7% at the 2nd measurement (Table 4)) and became similar to that of students in the control group.

All of the above indicates that the use of physical rehabilitation methods using three blocks is an effective means in the rehabilitation of students with disabilities, since it is based on the adaptive capabilities of the body, is individual in nature and takes into account the preferences of students when engaging in physical recreation.

Conclusions. This study examined the characteristics of the psychophysiological status of students with disabilities. It has been shown that a number of indicators significantly distinguish them from students without pathology. We considered it possible and necessary to take into account the level of activation of the nervous system, the strength of nervous process-

es, the dominant hemisphere and the level of anxiety to create an optimal physical recreation program for students with disabilities. The developed program is based on the standard principles of adaptive physical culture; The program was divided into blocks, each of which solves its own tasks and problems identified on the basis of studying the psychophysiological status of students.

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Features of physical rehabilitation of pregnant women after a new coronavirus infection Covid-19

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Abstract

Objective of the study was to develop and experimentally evaluate the effectiveness of a method of physical rehabilitation of pregnant women who have suffered from Covid-19.

Methods and structure of the study. A method of physical rehabilitation of pregnant women who have suffered from Covid-19 has been developed and experimentally tested, including a wide range of specially selected means and musical accompaniment.

Results and conclusions. An analysis of the literature and regulatory sources showed that pregnant women who have had Covid-19 require special attention and rehabilitation. Rehabilitation should be individual, including physical education, massage, psychoprophylaxis and hardening. The experimental technique showed an improvement in the vital capacity of the lungs, muscle condition and joint mobility, and stabilization of the emotional state of the rehabilitators. The PR process for pregnant women who have had Covid-19 should be individual and include a wide range of non-drug methods (physical exercise, massage, psychoprophylaxis, hardening).

Keywords: *coronavirus infection Covid-19, pregnant woman, physical rehabilitation (PR).*

Introduction. Currently, there is a lack of standards for the rehabilitation of pregnant women after Covid-19, which causes increased risks and complications for the expectant mother and fetus. It is known that infection has a negative effect on the respiratory, cardiovascular, nervous and endocrine systems, as well as on the mental state [1]. Therefore, there is a need to search for means and methods of physical rehabilitation for pregnant women, which are aimed at improving the functioning of the respiratory system, strengthening all muscle groups of the body, preparing the body for childbirth and preventing residual effects after an illness.

Objective of the study was to develop and experimentally evaluate the effectiveness of a method of physical rehabilitation of pregnant women who have suffered from Covid-19.

Methods and structure of the study. The basis of the methodology included general strengthening dynamic exercises for the arms, legs, torso, to strengthen the abdominal muscles, long back muscles and the muscular-ligamentous apparatus of the lower extremities, movements that improve metabolism, mandatory relaxation exercises, and joint gymnastics. In preparation for childbirth, much attention was paid to the establishment and development of full deep breathing, the ability to relax individual muscle groups, which is important during labor. The classes were accompanied by musical compositions to normalize the psycho-emotional state of pregnant women.

To assess the effectiveness of the PR technique, the following were used: questionnaires, interviews, specially selected functional tests (Robinson Index; spirometry; blood pressure measurement; Medical Research Council (MRC) scale; hip joint mobility) and psychological testing methods.

An experimental test was carried out on the basis of the Women's Consultation Center of the City Clin-

ical Hospital No. 7 of Kazan with the participation of 11 women with a pregnancy period of 22 to 36 weeks who had Covid-19 from 2 weeks to 6 months ago.

Results of the study and discussion. The use of the experimental technique led to a significant improvement: vital capacity of the lungs by 4.8%, the indicator of the condition of the muscles of the lower extremities (MRC scale) by 6.6%, the indicator of mobility of the hip joints by 4.1%, stabilization of the psycho-emotional state of the rehabilitators.

Conclusions. The process of physical rehabilitation of pregnant women who have suffered Covid-19 should be individual and include a wide range of non-drug methods (physical exercise, massage, psychoprophylaxis, hardening).

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Why might high-intensity interval training be attractive to the recreationally inactive contingent?

UDC 796 + 378.17

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Abstract

Objective of the study was to objectify the dynamics of affective valence in a group of healthy recreationally inactive females in response to low-volume, high-intensity interval training with their own body weight (whole-body HIIT).

Methods and structure of the study. Recreational-inactive healthy female students (n=11) who met the inclusion criteria took part in the experiment. Affective valence, heart rate and external parameters of physical activity were recorded.

Results and conclusions. Affective valence significantly decreased from 3.0 (3.0–3.0) to 0.0 (-1.0–1.0) points after overcoming the 85% threshold of the maximum predicted heart rate value, but after a cool-down (3.0 (3.0–5.0) points) the majority of subjects (54.5%) felt better than before the training (3.0 (2.0–3.0) points), which confirms presence of affective rebound. Thus, it is fair to conclude that the state of affective elation experienced after training may be one of the factors of adherence to low-volume whole-body HIIT.

Keywords: *affective rebound, low-volume whole-body HIIT, recreationally inactive students.*

Introduction. Over the past two decades, affective determinants of exercise behavior have received increasing attention in health promotion and noncommunicable disease prevention research [6]. The assumption that affective experiences play an important role in motivation to exercise is supported by the results of current research [12]. There is currently no consensus among health and fitness experts regarding the effects of high-intensity interval training (HIIT) protocols on exercise enjoyment. The following provisions are found: 1) HIIT is not suitable for widespread use in public health, as it causes negative sensations (displeasure) [2], the severity of which depends on the depth of the disturbance of homeostatic balance [5, 13] and, on the contrary, 2) HIIT contributes to obtaining pleasure due to affective rebound, directly related to the intensity of physical activity [12]. In this regard, Zenko & Ladwig [15] suggest that one of the most common maxims of exercise science, that "exercise improves well-being and brings pleasure," may be partially explained by suboptimal timing and frequency of measurement of affective reactions.

Nevertheless, rationally selected physical activity variables for the target population leading a sedentary lifestyle make it possible to program the desired physiological [4] and affective reactions [11]. In this regard, the development of low-volume, high-intensity training protocols and their testing on a recreationally inactive population, including those with metabolic disorders, has become relevant [9].

However, the available data from the scientific literature do not allow us to state whether the above provisions are valid for a healthy young recreationally inactive female population when performing low-volume high-intensity interval training with their own body weight (whole-body HIIT).

Objective of the study was to objectify the dynamics of affective valence in a group of healthy recre-

ationally inactive females in response to low-volume, high-intensity interval training with their own body weight (whole-body HIIT).

Methods and structure of the study. Female students of Pskov State University (n=11) who met the inclusion criteria (body mass index (BMI) <25 units; main group for physical education; lack of physical training practice over the past two months and medical contraindications to physical activity), possible risks and incentives for participation.

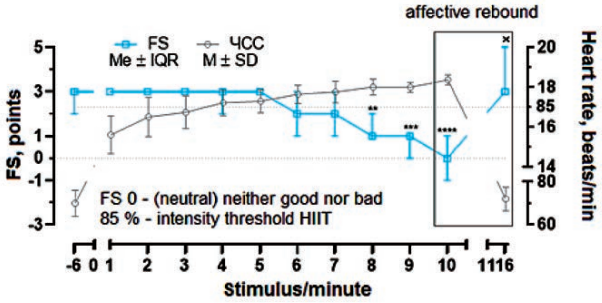
Detailed description of the low-volume whole-body HIIT training protocol (10 stimuli: 30 s - load / 30 s - rest) and procedures for measuring heart rate (HR, bpm (average value per minute)), affective valence (FS, points), external parameters of physical activity (number of repetitions of the exercise during each stimulus), body length and weight and the volume of weekly physical activity are presented in a previously conducted experiment [11]. To assess baseline and post-training indicators of physiological and affective reactions, additional measurements were taken at two extreme time points: a minute before the warm-up (-6 minutes) and after the cool-down (16 minutes).

Statistical processing, data analysis and visualization of the results were carried out in the GraphPad Prism 8 program (GraphPad Software, USA, 2020). The D'Agostino-Pearson and Anderson-Darling tests were used to check the normality of data distribution. Variables that passed normality tests were analyzed using parametric statistical methods. Comparison of group median values of variables obtained in the main part of the training was carried out using the Friedman test for repeated measures and Dunn's post-specific test. Data from the text are presented in Me format (Q1–Q3). Comparisons of group means were performed using one-way analysis of variance (ANOVA) for repeated measures and Dunnett's post hoc test. Data in the text are presented in M±SD format. Comparisons of pre-warm-up and post-cool-down scores were made using the Wilcoxon test (nonparametric data) and paired Student's t test (parametric data). Statistical significance was accepted at $p < 0.05$.

Results of the study and discussion. The average age of the subjects in the group was 19.6 ± 0.9 years, total physical activity was 2934.0 ± 664.0 MET min/week, body mass index was 22.4 ± 1.5 units. All subjects had a main group for physical education and declared no physical training over the past two months.

The figure shows the main results of the study.

Before the warm-up, the group mean heart rate was 69.9 ± 6.1 beats/min, after the cool-down it was



Dynamics of physiological and affective reactions to low-volume whole-body HIIT

Note: M – average value; SD – standard deviation; Me – median; IQR – interquartile range; ** – significant differences in FS compared to the first stimulus ($p<0.01$), *** – ($p<0.001$), **** – ($p<0.0001$); × – significant differences in FS "before warm-up – after cool-down" ($p<0.05$)

72.0 ± 5.5 beats/min ($p=0.0863$). Starting with the fourth stimulus, the group mean HR exceeded 85% of the theoretically predicted maximum. The average heart rate increased throughout the main part of the training protocol, the group indicator from stimulus to stimulus became more homogeneous and reached 91.6% of the theoretically predicted maximum. The first stimulus on average for the group was 156.0±9.5, and the tenth 183.7±2.6 beats/min ($p<0.0001$).

The group median value of affective valence before the warm-up was 3.0 (2.0–3.0) points, after the cool-down 3.0 (3.0–5.0) points ($p = 0.0313$). After the cool-down, six subjects felt better (54.5%) than before the warm-up, five felt at the same level (45.5%), and none felt worse. The sample range was 2.0 points at both points.

Affective valence decreased in response to physical activity. However, the first stimuli did not initiate reliable changes in affective valence. Extreme stimuli caused a significant decrease in affective valence and had a wider variability of reactions, with uniformly high heart rates. After the first stimulus, well-being was rated as 3.0 (3.0–3.0), and after the final one 0.0 (-1.0–1.0) points ($p<0.0001$). The range for the sample was 0.0 and 4.0 points, respectively.

The number of exercise repetitions during each stimulus was within the 95% confidence interval previously experimentally obtained as the maximum achievable values for this category of subjects [1], which indicated work in the "all-out" target mode.

The main result of the study is confirmation of the presence of the phenomenon of affective rebound in healthy recreationally inactive female individuals in response to low-volume whole-body HIIT. This correlates well with the results obtained by researchers that the discomfort associated with high-intensity physical activity "rebounds" (i.e., returns to the same or higher level) immediately after the cessation of exercise

[3, 10]. Therefore, presumably, after the cool-down, many subjects felt better than before the workout.

A decrease in affective valence was observed after passing a threshold of 85% of the maximum predicted heart rate, which is consistent with the theoretical dual mode model (DTM) [7]. Therefore, most people experience pleasant sensations at subthreshold intensities of physical activity; near the anaerobic threshold, strong interindividual variability of sensations is visible, and at suprathreshold intensities, uniformly negative sensations are recorded [8]. The findings may have practical implications for programming low-volume health-improving, high-intensity training protocols to maximize positive affective responses. At the same time, the etiology of affective rebound remains unclear, and the extent to which a decrease in affective valence during whole-body HIIT and, conversely, affective rebound influence the formation of adherence to this type of training.

Conclusions. The dynamics of affective valence when performing low-volume whole-body HIIT in a group of recreationally inactive female students has a negative trend. However, at the end of the workout, participants often feel better than before the workout, which confirms the presence of affective rebound, which may be a factor in adherence to low-volume, whole-body HIIT.

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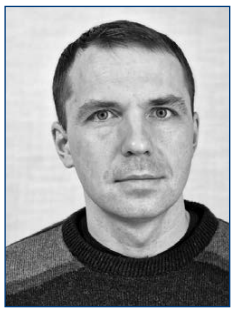
Formation of independent skills physical training for university students

UDC 796.011.1



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Abstract

Objective of the study was to develop pedagogical recommendations for developing students' skills in organizing independent physical training.

Methods and structure of the study. The pedagogical experiment was carried out on the basis of Belgorod and Moscow universities. 340 senior students took part in it. In the experimental group, complexes of special and methodological classes were used, as well as various activities aimed at mastering the skills of independent physical training during the semester at least once a week. To assess the level of mastery of the skills to organize independent physical training, a survey was conducted.

Results and conclusions. Of all the skills assessed, gnostic skills received the highest score. This emphasizes that knowledge, which must be up-to-date, plays an important role in organizing independent physical training. Organizational skills are considered important. As part of the classes, it is necessary to solve problems related to the formation of self-educational competence of students. This will allow, upon graduation, not to experience difficulties in organizing and conducting independent physical training to maintain a high level of physical fitness.

Keywords: *physical training, educational process, independent training, students.*

Introduction. Studying in higher educational institutions requires young people to be independent. This circumstance necessitates the development of a pedagogical system with the strengthening of self-educational activities of students. Many authors indicate that there is a need to develop skills in organizing independent physical training [2, 6]. In particular, this is due to the requirement to maintain a high level of physical fitness during educational activities [4, 5].

Modern activities of students in educational organizations are connected not only with educational activities. All this has an impact on the process of training future specialists [2, 3, 5]. In this situation, an effective means of maintaining the required level of physical fitness is independent physical training, which allows students to combat the negative factors of professional training [3, 5].

At the same time, studies [2, 5, 7] indicate that the majority of students do not have the skills to organize and conduct independent physical training. What is the result of the lack of classes related to the formation of these skills in the process of educational activities.

Objective of the study was to develop pedagogical recommendations for developing students' skills in organizing independent physical training.

Methods and structure of the study. To achieve this goal, a pedagogical experiment was organized and conducted on the basis of Belgorod and Moscow universities. It was attended by students who were divided into two groups of 170 people. In the experimental group, complexes of special and methodological classes were used, as well as various activities aimed at mastering the skills of independent physical training during the semester at least once a week.

To assess the level of students' mastery of the skills to organize independent physical training, a survey was conducted with the further use of the method of generalizing independent characteristics.

Results of the study and discussion. In the process of conducting a pedagogical experiment, students in the experimental group were introduced to the basic principles, means and methods of sports training. They also paid attention to the continuous updating of knowledge in the field of physical culture to increase the effectiveness of training and increase motivation. Practice has shown that the knowledge acquired by students largely determines the level of proficiency in organizing independent training. To test the effectiveness of the proposed means, students were surveyed and the results were further processed using the method of generalizing independent characteristics. Figures 1-3 present the results of various indicators that assess the ability to organize independent physical training.

Figure 1 shows the results of a survey of teachers of the Department of Physical Education, how they assessed the ability of students to organize and conduct independent physical training. Before the start of the experiment, students in both groups possessed the necessary skills at a fairly low level. By the end of the experiment, the studied indicators changed in the groups, but significant changes were noted in the experimental group.

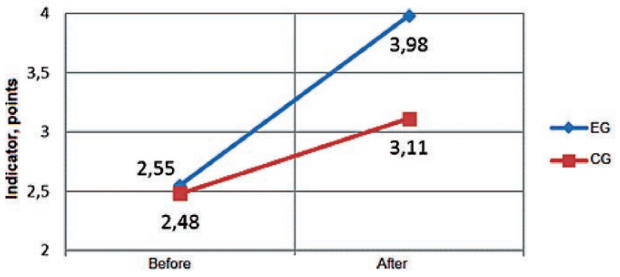

Figure 1. *Teachers' opinions regarding students*

An assessment of knowledge about methods of organizing and conducting independent physical training is presented in Figure 2. The skills of self-control and determining the required level of physical activity were also assessed. Thus, by the end of the experiment, students in both groups had higher knowledge and skills in the studied indicators than before the start of the experiment. Significant changes were noted in the experimental group.

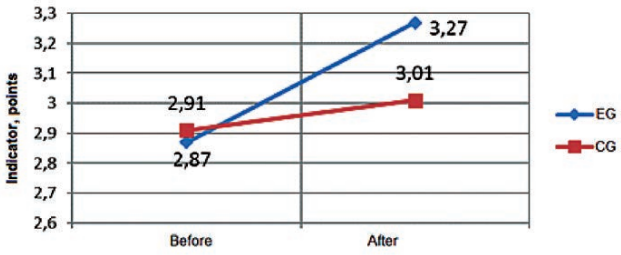

Figure 2. *Assessment of knowledge about independent physical training*

An important factor influencing the performance of independent physical training is the motivational component [1]. The dynamics of the motivational component among students is presented in Figure 3. Significant changes were noted in the experimental group. This is a consequence of regular activities associated with independent training, as well as stimulation for the constant search for new information regarding independent physical training.

Figure 3. *Dynamics of the motivational component*

The table presents the results of assessing general pedagogical skills. Of all the skills assessed, gnostic skills received the highest score. This emphasizes that

Dynamics of indicators of general pedagogical skills of students

Groups		Gnostic	Creative	Design	Organizational	Communication
CG	Before	3,52±0,15	2,89±0,17	2,73±0,18	2,84±0,19	2,51±0,14
	After	3,81±0,13	3,11±0,12	3,05±0,14	3,15±0,12	3,02±0,13
	P	-	-	-	-	-
EG	Before	3,57±0,14	3,52±0,12	3,41±0,14	3,43±0,15	3,42±0,14
	After	4,78±0,12	4,42±0,14	4,45±0,11	4,52±0,14	4,29±0,17
	P	+	+	+	+	+

knowledge, which must be up-to-date, plays an important role in organizing independent physical training. Organizational skills are considered very important. Creative and design skills come next, followed by communication skills.

Conclusions. The results of the study showed the effectiveness of the proposed methodological techniques for developing students' ability to organize independent physical training. But the process of their education in this matter should be carried out throughout the entire duration of their training in educational organizations. As part of the classes, it is necessary to solve problems to develop the self-educational competence of students. This will allow, upon graduation, not to experience difficulties in organizing and conducting independent physical training to maintain a high level of physical fitness.

To effectively develop students' skills in organizing and conducting independent physical training, it is necessary during classes to pay attention to finding and solving problems related to increasing physical fitness and functional fitness, creating sustainable motivation for physical education, instilling confidence in the ability to carry out independent physical training. training, mastering knowledge of self-control.

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Effectiveness of using representative training methodology for teaching physical education in universities and colleges

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Abstract

Objective of the study was a comparative assessment of the effectiveness of the representative training technique and traditional methods of teaching Taijiquan.

Methods and structure of the study. The scientific work was carried out in the athletics arena of the Sports Faculty of Soochow University. At the beginning of the study, the subjects (n=39, 17-25 years old, qualification – I-II category) were divided into experimental (EG, n=20, 10 girls, 10 boys) and control (CG, n=19, 9 girls, 10 boys) group. The EG included subjects who, in the opinion of the trainer, were less capable of successfully mastering the basic elements of Taijiquan, who showed the lowest activity in training and were in greater need of the help of a psychologist.

Results and conclusions. In the experimental group, the quality of performing three Taijiquan exercises after a training cycle using the representative training technique significantly increased both according to self-assessment and as assessed by the trainer. In the control group, after a cycle of training conducted according to the usual university methodology, the quality of performing two of the three exercises, both according to self-assessment and as assessed by the trainer, on the contrary, significantly decreased; ratings and self-assessments of only the quality of performing the first exercise significantly increased ($p<0.01$), since its development was not so strongly influenced by the psychological fatigue of the subjects. Participants in the CG require volitional efforts to perform exercises, which leads to psychological fatigue. This is accompanied by a deterioration in the functions of some sensory systems, as evidenced by a significant decrease in the speed of switching attention and coordination of movements in the CG.

Keywords: *representative training, image-representation, analyzer, second-signal regulation system, reference image of motor action.*

Introduction. A motor image is a person's idea of the movement that he must make, a movement program (N.A. Bernstein, P.K. Anokhin, D.D. Donskoy, etc.). Representative training is a teaching methodology aimed at identifying and using for training any specific features of single images (for example, muscle-motor sensations) that are important for the effectiveness of the cognitive process, performing a motor task, increasing their share in the emerging image-representations, standards, in accordance with which the action performed will be adjusted.

Objective of the study was a comparative assessment of the effectiveness of the representative training technique and traditional methods of teaching Taijiquan.

Methods and structure of the study. The scientific work was carried out in the athletics arena of the Sports Faculty of Soochow University. Methods: 1) method for determining the speed of switching attention using Schulte tables, modified by Gorbov; 2) Rosenberg self-esteem scale; 3) questionnaire for the Use of Imagery in Sports (SIQ), adapted into Russian by A.N. Veraksy, A.E. Gorovoy, A.I. Grushko, L.F. Bayanova, M.Sh. Galiullina, D.G. Galyavieva, 2014; 4) test to determine the preferred representative system (Tad James, 1990); 5) questionnaire "Degree of chronic fa-

tigue" (A.B. Leonova, 1984); 6) method Relief of mental state (A.O. Prokhorov. 1998); 6) assessment of the success of mastering the elements of taijiquan using specially developed author's tables.

At the beginning of the study, the subjects (n=39, 17-25 years old, qualification – I-II category) were divided into experimental (EG, n=20, 10 girls, 10 boys) and control (CG, n=19, 9 girls, 10 boys) group. The EG included subjects who, in the opinion of the trainer, were less capable of successfully mastering the basic elements of tai chi, who showed the lowest activity in training and were in greater need of the help of a psychologist.

Results of the study and discussion. A comparative analysis showed that the low activity of the subjects from the EG before the experiment could be due to their reluctance to reduce self-esteem (lose self-esteem) due to problems with mastering basic tai chi exercises. The difficulties are due to the lower abilities of the EG subjects to quickly construct and implement complex action programs. This was evidenced by:

1. Significantly lower assessments by the trainer and self-assessments of the correctness of performing the 1st and 2nd taijiquan exercises;

2. Significantly longer time to complete the 2nd and 3rd tasks of the Gorbov-Schulte test (slow search for red numbers in descending order from 24 to 1 and alternate search for numbers);

3. Emotional dullness of visual images (indicator of the "Use of imagination in sports" methodology). Negative emotions that appear during failure can contribute to abstraction from visual images and cause formal, mechanistic repetition of movements. At the same time, the ability to use visual images for activation, to regulate one's state, to change the level of anxiety and emotional arousal decreases. After the experiment, the subjects from the EG coped significantly better with chronic fatigue, including due to significantly higher emotional brightness of images, active and independent use of the influence of images on their emotional state.

In the CG, more significant volitional efforts were required to perform the exercises, which contributed to significantly higher psychological fatigue (indicators of the "Degree of Chronic Fatigue" questionnaire were 2-5 times higher than in the EG). The quality of exercise performance in the EG after the experiment was significantly higher than in the CG, both according to self-assessment and as assessed by the trainer (see table).

Conclusions. In the experimental group, the quality of performing three Tai Chi exercises after a training cycle using the representative training technique significantly increased both according to self-assessment and as assessed by the trainer. In the control group, after a cycle of training conducted according

Significant differences according to the Mann–Whitney U test of indicators obtained after the experiment in the experimental (EG, n=20) and control (CG, n=19) groups

Methods	Indicators	EG		CG		U emp.	p
		$\bar{X}$	σ	$\bar{X}$	σ		
Academic performance (average score for the past semester)		**93,6**	3,9	84,47	5,26	**28,0**	**0,000**
Elements of successful mastery of Taijiquan	Self-assessment 1 exercise	**86,0**	9,1	**60,8**	8,86	**8,5**	**0,000**
	Trainer's assessment of 1 exercise	**76,5**	11,9	**49,7**	6,97	**14,5**	**0,000**
	Self-esteem 2 exercises	**88,5**	7,1	68,68	9,55	**11,0**	**0,000**
	Trainer assessment 2 exercises	**77,5**	9,1	62,63	6,53	**43,0**	**0,000**
	Self-esteem 3 exercises	**85,5**	6,9	56,05	14,87	**9,5**	**0,000**
	Trainer assessment 3 exercises	**73,3**	10,3	43,95	13,50	**17,5**	**0,000**
Using imagination in sports. Emotional brightness of images, use of the influence of images on the emotional state.		**4,8**	1,1	**3,7**	1,58	124,0	***0,064***
Questionnaire "Degree of chronic fatigue"	Symptoms of physiological discomfort	5,8	7,2	25,96	9,27	**16,0**	**0,000**
	Decreased general well-being and cognitive discomfort	18,8	6,5	29,47	11,77	**86,5**	**0,004**
	Disturbances in the emotional-affective sphere	11,3	9,1	25,44	14,29	**80,0**	**0,002**
	Decreased motivation and changes in social communication	29,5	18,8	**46,3**	19,21	**97,0**	**0,009**
	Chronic fatigue index (CFI)	10,3	3,5	21,37	5,09	**10,5**	**0,000**

to the usual university methodology, the quality of performing two of the three exercises, both according to self-assessment and as assessed by the trainer, on the contrary, significantly decreased; ratings and self-assessments only significantly increased the quality of performing the first exercise ($p<0.01$), since its development was not so strongly influenced by the psychological fatigue of the subjects. Participants in the CG require volitional efforts to perform exercises, which leads to psychological fatigue. This is accompanied by a deterioration in the functions of some sensory systems, as evidenced by a significant decrease in the speed of switching attention and coordination of movements in the CG.

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Analysis of the system for control of physical fitness of army military servants of Russia, the USA and Venezuela

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Abstract

Objective of the study was to conduct a theoretical analysis of the system for monitoring the physical fitness of military personnel of various armies of the world, systematize their content, identify general trends and directions of physical training of military personnel in world practice.

Methods and structure of the study. The relevant scientific and methodological literature was analyzed on the topic of the study. The basis was an analysis of the physical fitness monitoring system of the two best armies in the World: Russia and the USA, as well as the Armed Forces of Venezuela.

Results and conclusions. It is necessary to improve the content of physical training of military personnel of the armies of Russia, the USA and Venezuela, namely: to include complex control exercises to simultaneously assess all basic physical qualities, pay attention to the development of mobility of the musculoskeletal system of military personnel, expand the content of physical training based on the inclusion of modern technologies and means taking into account the changing tactics and strategies of military conflicts in the modern World.

Keywords: *physical fitness of military personnel, analysis, control exercises, army.*

Introduction. Currently, the physical fitness of military personnel of the Armed Forces of various countries is important. Modern military conflicts place high physical and psychological demands on military personnel, which include the ability to quickly and quietly move across various terrain, overcome complex obstacles, withstand high speed, power, aerobic and static overloads, and at the same time clearly and effectively carry out the tasks assigned by the command. All this is possible subject to the versatile and comprehensive physical training of military personnel. An important component of the physical training of military personnel is monitoring the effectiveness of its formation. Thus, the main direction of this work is to analyze the system of monitoring the physical fitness of the Armed Forces of various states using the example of Russia, the USA and Venezuela.

Objective of the study was to conduct a theoretical analysis of the system for monitoring the physical fitness of military personnel of various armies of the world, systematize their content, identify general trends and directions of physical training of military personnel in world practice.

Methods and structure of the study. The relevant scientific and methodological literature was analyzed on the topic of the study. The basis was an analysis of the physical fitness monitoring system of the two best armies in the World: Russia and the USA, as well as the Armed Forces of Venezuela. Analysis of control exercises allows us to see the content of the physical training of military personnel, the development of which physical qualities are given preference in various armies, how versatile and comprehensive the physical training of soldiers is, physical fitness standards, etc.

Control exercises on physical fitness of military personnel of the armies of Russia, the USA and Venezuela

Physical qualities	Control exercises		
	Russia	USA	Venezuela
General stamina	Running 3 km and 1 km; skiing 5 km	2 mile run	2400 m run
Speed qualities	100 m run	Shuttle run 10x10 m	-
Strength qualities	Pull-ups on a high bar; flexion and extension of the arms while lying down	Deadlift, flexion and extension of the arms while lying down	Flexion and extension of the arms while lying down
Flexibility	-	-	-
Speed and strength qualities	Raising torso from a lying position in a minute	Throwing a ball back over the head (P=5 kg); from hanging on bent arms, pulling your knees to your chest	Squats in a minute
Agility and speed	Shuttle run 10x10 m	Shuttle run 10x10 m	-
Static force	-	Deadlift	-

Results of the study and discussion. In the process of analyzing scientific and methodological literature, a table was formed in which the following indicators were systematized: basic physical qualities necessary for military personnel, control exercises of the Armed Forces of Russia, the USA and Venezuela.

The analysis of control exercises of physical fitness of military personnel of the armies of Russia, the USA and Venezuela showed the following results: to control the physical fitness of military personnel of the Russian army, 8 control exercises were selected and formed, in the US army - 6 control exercises, for military personnel of the Venezuelan army - 3 control exercises. Control exercises, designed to assess the physical fitness of military personnel of the Russian army, are aimed at monitoring the harmonious formation of all basic physical qualities; in the US Army, the emphasis is on developing speed and strength qualities; Among Venezuelan army personnel, the emphasis is on developing general endurance and strength qualities. We also draw attention to the fact that in the Armed Forces of Russia, the United States and Venezuela, insufficient attention is paid to the development of mobility of the musculoskeletal system of military personnel.

Conclusions. The analysis of the content of monitoring the physical fitness of military personnel in the armies of Russia, the United States and Venezuela showed the following analytical results: control exercises on the physical fitness of military personnel of the Russian army are aimed at assessing the harmonious formation of basic physical qualities; among US Army personnel, the emphasis is on developing speed-strength qualities and static endurance; In the Armed Forces of Venezuela, attention is paid to the development of only general endurance and strength, a narrow focus on physical training.

Thus, it is observed that it is necessary to improve the content of physical training of military personnel of the armies of Russia, the United States and Venezuela, namely: include complex control exercises to simultaneously assess all basic physical qualities, pay attention to the development of mobility of the musculoskeletal system of military personnel, expand the content of physical training to based on the inclusion of modern technologies and means, taking into account the changing tactics and strategies of military conflicts in the modern World.

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Motivational attribution of students as a basic method in communicative and cognitive approach for the purposes of learning a second foreign language

UDC 796

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Abstract

Purpose of Research. This research aims at creating the motivational attribution method for students who learn their second foreign language (French) and already have some experience of learning English as their first one.

Method and Organization of Research. To create the motivational attribution method we put to analysis relevant literature, run an educational experiment and also applied expert evaluation and mathematical statistics methods (measure of central tendency, like mean value, standard error of the mean as well as the paired comparison method by Wilcoxon, and Spearman's rank correlation coefficient.)

The research was participated by 30 students who study their second foreign language (French) in a sports college and who already have some experience of learning English as their first foreign language. Expert surveys basing on ten motivational attribution factors were done both in the beginning and at the end of the studying period.

Results and Conclusions. This research aims at creating a method for motivational attribution of students who learn their second foreign language (French) and already have some experience of learning English as their first one. For this purpose, we put to analysis relevant literature, run an educational experiment and also applied expert evaluation and mathematical statistics methods. The results achieved include definitions of motivational attribution factors as well as model characteristics thereof. The article also describes the method and calculation procedure. The reliability of motivational attribution method has been proved through test-retest.

Keywords: *motivational attribution, self-absorption, irritability, carelessness, emotional disequilibrium, sense of guilt, persistence, nervousness, fear of difficulties, communication barrier, high moral, second foreign language.*

Introduction. Fluency in foreign languages is a key skill for successful international relations in economics, politics, culture and other areas. This means that new approaches to teaching foreign languages are required for both secondary and higher schools [3].

Today, a professional in any area would hardly succeed without knowing at least two foreign languages. This makes it very essential for linguists, curriculum developers, and language teachers to review the theoretical framework of teaching foreign languages and cultures and consequently, to adjust the system of their teaching practices [4]. As a rule, a second foreign language is taught under the specific curriculum that takes into account every difficulty that a student might encounter while studying yet another foreign language [1, 2, 8].

The communicative and cognitive approach implies that students are guided by their intellect and the processes that underlie understanding and applying this phenomenon in the course of communication. Besides, this approach implies that all sorts of language competencies (listening, speaking, reading and writing) are closely inter-related for the purposes of teaching [1].

Motivation is a key driver that activates all the psychological processes, like thinking, perceiving, understanding and absorbing information in a foreign language [5]. Considering this, to improve the learning efficiency we created the motivational attribution method based on the method of motivational attribution of aggressive behavior by V.S. Sobkin [6] and the model of aggressive personal culture by S.Sh. Tsakaev [7].

Purpose of Research. This research aims at creating the motivational attribution method for students who learn their second foreign language (French) and already have some experience of learning English as their first one.

Method and Organization of Research. To create the motivational attribution method we put to analysis relevant literature, run an educational experiment and also applied expert evaluation and mathematical statistics methods (measure of central tendency, like mean value, standard error of the mean as well as the paired comparison method by Wilcoxon, and Spearman's rank correlation coefficient.)

The research was participated by 30 students who study their second foreign language (French) in a sports college and who already have some experience of learning English as their first foreign language. Expert surveys basing on ten motivational attribution factors were done both in the beginning and at the end of the studying period.

Results and Discussion. *Motivational Attribution Method Description.* The motivational attribution method is a kind of expert survey participated by group mates. As observers, these experts evaluate the motivational attribution factors of their group mates who take part in the learning process. Thus, acting as expert each student assesses each of his/her group mates using the proposed motivational attribution factors. The number of experts equals to the number of students in the group less the assessed one (self-assessment is not done.) Each motivational attribution factor is assessed using binary scale, i.e. while assessing each group mate, the expert is to identify whether the particular factor is present or not. Thus, the value of aggressiveness factor is equal to the number of experts who identified presence of this factor while assessing a particular person. In case assessments are done by different number of experts, relative number of 'votes' is considered, i.e. the share of 'votes for' in the total number of experts (denominated in percent.)

Students who act as experts are required to fill in a questionnaire identifying the presence/absence of the 10 motivational attribution factors in one of the stressful situations, e.g. the homework in the second foreign language (French) is not done. Listed below are the definitions of the 10 motivational attribution factors.

Self-absorption is being incapable of considering someone else's point of view; it simply does not occur to a self-absorbed person that anyone else may be right.

Irritability is excessive agitation and susceptibility to negative emotions.

Carelessness is a tendency to act hastily without proper consideration or thinking about the consequences.

Emotional disequilibrium is a lack of self-possession and self-control when emotions prevail.

Sense of guilt is an unhappy feeling caused by failure to comply with the standards or to do a duty to oneself (it may be caused by the one's belief that he/she is a bad person).

Persistence is a very important quality of powerful and strong-minded people, an ability to pursue one's objectives.

Nervousness is a subjectively unpleasant emotional state, the feeling of anxiety and uncertainty.

Fear of difficulties is anxiety or fear to encounter insurmountable obstacles.

Communication barrier is a kind of 'invisible wall', a mental obstacle that makes it hard for people to understand each other.

High moral is being very sensitive to the moral aspects of one's actions, self-criticism.

Metrological Verification of the Method. Repeated measurements did not reveal any statistically significant changes in values of the motivational attribution factors ($p>0.05$). The method chosen to identify the motivational attribution factors is deemed to be reliable as the indicators considered do not show any statistically significant changes, besides, high statisti-

Table 1 – Coefficients of reliability in test-retest ($p \leq 0.05$) for Motivational Attribution Method

Motivational attribution factor	Test-retest, r
Self-absorption	0.79
Irritability	0.87
Carelessness	0.88
Emotional disequilibrium	0.80
Sense of guilt	0.66
Persistence	0.74
Nervousness	0.72
Fear of difficulties	0.87
Communication barrier	0.75
High moral	0.82

Таблица 2 – The model characteristics of motivational attribution for students who study their second foreign language in a sports college

Motivational attribution factor	M±SE (%)
Self-absorption	13.1±2.9
Irritability	23.2±3.1
Carelessness	33.1±3.3
Emotional disequilibrium	19.1±2.8
Sense of guilt	39.8±2.5
Persistence	42.1±2.4
Nervousness	42.7±2.8
Fear of difficulties	23.1±2.8
Communication barrier	17.5±2.9
High moral	26.5±3.2

cally significant correlation coefficients were obtained through test-retest (p≤0.05) (table 1).

Model Characteristics of Motivational Attribution. Model Characteristics of Motivational Attribution. For every factor considered, we took the average value of two measurements of each motivational attribution factor for all the study participants (n=30) as the model characteristics of motivational attribution for students who study their second foreign language in a sports college (table 2).

The teaching process takes into account the values of factors to boost the efficiency of learning the second foreign language (French) through using the constructive potential of the motivational attribution factors.

Conclusions. 1. The method presented includes relative values (denominated in percent) for ten factors of motivational attribution of students who study their second foreign language (French) in a sports college. This method allows comparing the obtained data regardless of the number of experts who take part in evaluating the said factors as the result is presented as ratio between the score and the number of experts. This makes it possible to use the data received through this method in other related areas.

2. Applying the method of motivational attribution in the course of teaching a second foreign language facilitates the using of communication and activity approach taking into account the individual behavior patterns of students that are manifested in different levels of respective factors of their motivational attribution.

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