Theory & Practice of Physical Culture

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

The role of professionally applied physical education in the training of future managers

Scientific research shows that professionally applied physical training in the process of studying at a university affects the acquisition of work skills, the creation of prerequisites for sustainable and high working capacity. Along with this, it increases the body's resistance to the adverse effects of the industrial environment and reduces morbidity, contributes to the professional longevity of the workforce. The implementation of professionally applied physical training is based on an important principle of the pedagogical system - the principle of the organic connection of physical education with the practice of work.

Within the framework of professionally applied physical training of management students, special tasks are solved, for which appropriate methods and means of physical education are selected. Physical training programs integrate exercises to develop endurance, strength, coordination and flexibility, which allows future managers not only to maintain excellent physical fitness, but also to improve their mental and emotional state. This, in turn, is reflected in the development of their leadership qualities, such as self-confidence, determination and perseverance.

The content of practical classes includes elements of team sports, where students learn to work in a team and develop skills to achieve goals together, which characterize a successful manager in terms of interaction with colleagues. Along with this, preference is given to the potential of individual training, which is closely correlated with the improvement of the personal qualities of the future specialist.

Since managerial work is often accompanied by crisis situations, an important focus of professional and applied physical training classes is learning relaxation techniques, attention and concentration exercises that affect the development of stress management skills.

It should be noted that the education of the personal qualities of a future manager within the framework of professionally applied physical training is most effectively implemented in sportized forms organized on the principles of sports training: systematic and undulating loads, cyclical training process, focus on maximum possible achievements, unity and interrelation of the structure of competitive activity and the structure of the athlete's fitness.

Motivation to participate in sports activities is effectively formed in the space of sports culture, which presupposes the valuable development by students-future managers of the means, forms and methods of sports activities, the goal of achieving high athletic performance and maintaining a sporty lifestyle.

Systematic training sessions require such qualities as organization and the ability to set priorities, which is reflected in the professional activity of a manager, where the ability to manage time and resources is included in the range of his key competencies.

Participation in professionally applied sports events helps to develop the stress tolerance and determination of a future managerial specialist. When faced with physical and psychological challenges, future managers acquire the skills to overcome difficulties, make informed and prompt decisions, which builds self-confidence and self-reliance. The effective realization of the educational sports potential of professionally applied physical culture in the formation of personal qualities of future managers is based on the means of applied training and the values of sports culture.

The professionally applied physical culture of the future manager is an important element of the university's educational program, which forms the basis for his physical and psychological well-being, as well as reveals the possibilities of displaying the professional competencies of an effective manager. The educational environment lays the investment foundation for the health and personal growth of the future leader and defines the strategic guideline of the coming civilization.

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

The preparedness of physical education graduates to plan and implement physical activity programs for seniors

UDC 37.013.3

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Abstract

Objective of the study was to ascertain the framework of the preparedness of physical education graduates to engage with the elderly and to ascertain the educational potential for its development in the context of foreign language instruction.

Methods and structure of the study. The theoretical framework for this research was grounded in the principles of competence-based, gerontological, integrative, activity-oriented, and systematic approaches to the training of bachelors in the field of 49.03.01 «Physical Culture». The research was conducted at the Institute of Physical Education, Sports, and Life Safety at I.A. Bunin Yelets State University from 2022 to 2024, focusing on foreign language classes for first- and second-year students. A total of 52 students participated in the experiment.

Results and conclusions. The framework for the preparedness of future physical education bachelors to work with the elderly is outlined: a combination of motivational and value-based, theoretical and practical readiness, encompassing operational, organizational, methodological, and reflective aspects. The content-technological framework for this process has been established, and the content-technological foundation for its development in the context of foreign language education has been established.

Keywords: *readiness, elderly people, foreign language training, bachelor of physical education, gerontological approach.*

Introduction. At present, an important state task is to increase the life expectancy of elderly Russians, in the solution of which a large role is given to the training of specialists in physical education and sports who are capable of working with this category of people [3]. According to the requirements of the Federal State Educational Standard[1] and Professional Standard[2], this area of professional activity of a bachelor requires a certain level of theoretical knowledge in the field of gerontology, biology, psychology, as well as motivational preparedness, development of professional skills, mastery of methods, means, forms of physical education and health impact, formation of certain traits and qualities of personality, which together constitutes the professional competence of a bachelor. Practice shows that in the work of graduates of physical education universities with elderly people, there are a number of shortcomings, which is explained by contradictions, first of all, in their university training: between the requirements of the state to solve the problem of increasing the life expectancy of elderly Russians and the insufficient level of training of bachelors in the gerontological aspect; between the focus on traditional specialized university disciplines of the curriculum of the educational program in this area of training and the great educational potential of the disciplines of non-specialized modules. The educational potential of the discipline "Foreign Language" can play a major role in resolving this contradiction.

1. Professional standard "Trainer", approved by the order of the Ministry of Labor and Social Protection of the Russian Federation dated March 28, 2019 No. 191n.

2. Federal State Educational Standard of Higher Education in the field of training 49.03.01 Physical Education, approved by order of the Ministry of Education and Science of the Russian Federation dated September 19, 2017 No. 940.

Objective of the study was to ascertain the framework of the preparedness of physical education graduates to engage with the elderly and to ascertain the educational potential for its development in the context of foreign language instruction.

Methods and structure of the study. The methodological basis of the study was formed by the competence, system, activity, gerontological, integrative approaches to the training of bachelors studying in the direction of 49.03.01 «Physical Education». Focus (profile) Sports training and physical education and health work. The main research methods are theoretical analysis (study and analysis of regulatory documentation, research on this issue, design). The study was conducted at the Institute of Physical Education, Sports and Life Safety of Yelets State University named after I.A. Bunin in 2022-2024 in foreign language classes of the 1st and 2nd years of study. A total of 52 students were involved in the experiment.

Results of the study and discussion. The issue of formation of readiness of future specialists in physical education and sports for professional activity has been studied by many domestic scientists (M.Ya. Vilenskiy, E.N. Grigoryev, V.L. Dementyev, Yu.D. Zheleznyak, A.V. Sverchkov and others). They have identified the specificity of this profession, highlighted specific personal professional qualities of a trainer, defined the technology and content of university training for future professional activity. Issues of the gerontological approach of a trainer to the performance of professional functions have become the subject of study by A.A. Kilimnik, O.A. Mosina, S.A. Khazova, A.K. Khashkhanok and other specialists [2, 3]. At the same time, it should be noted that there are no studies in the preparation of future bachelors for physical education and health activities with elderly people in the process of studying a foreign language. A number of scientists note that the formation of professional readiness of future specialists in the field of physical education should be based on the activity-based and systemic approaches [1, 2]. The activity-based approach implies the actualization of the effective position of the personality of the future bachelor for the purpose of professional self-improvement. The systemic approach assumes integrity in educational and practical activities aimed at the comprehensive formation of professional readiness of future bachelors [4]. Integrity in educational and practical activities means a comprehensive mastery of issues related to the preparation of bachelors to work with the elderly. Therefore, the methodological basis for the formation of professional readiness of future bachelors of physical education is an integrative approach to the selection of substantive foundations of training, aimed at studying the materials of related disciplines in the process of foreign language education: developmental psychology, physiology, pedagogy, sociology, etc. The choice of a competence-based approach is associated not only with the formation of subject knowledge and skills, but also with the development of important professional qualities of a specialist in demand in the 21st century in students: communication skills, independence, cognitive activity, creative thinking. The gerontological approach allows us to study the problem of future bachelors' readiness to carry out professional activities taking into account various aspects of aging.

We consider the bachelor's readiness to carry out physical education and health activities as a holistic systemic formation that integrates a value attitude to the inclusion of the gerontological approach in the practice of future professional activities, knowledge of the basics of gerontology, the ability to perform professional functions taking into account the gerontological specifics of the physical education and health process, an assessment of one's professional activities, as well as the desire for self-education. The characteristic of readiness includes the ability to actualize in physical education and health activities with older people those properties and qualities of the personality that allow one to adapt to this nature of professional activity and implement it productively.

Thus, the structure of the future bachelor's readiness to carry out physical education and health work with older people includes several components of readiness. Motivational and value readiness to work with older people includes a positive attitude of the future bachelor towards working with this category of the population, awareness of the importance of their professional activities, understanding and acceptance of the goals and values of older people. Theoretical readiness implies cognitive readiness, which presupposes the presence of the necessary knowledge in the field of related disciplines (psychology, biology, developmental physiology, sociology, gerontology, etc.). But the bachelor's readiness to conduct physical education and health activities with the elderly is not limited to providing a certain amount of knowledge. It is necessary to develop practical readiness – the ability to implement the principles of gerontology through physical education and health activities among elderly

citizens in order to improve their health and reduce the risks of their desocialization. Practical readiness includes operational readiness: the ability to project knowledge of one's future professional activity into the field of practical application. An important task of developing the readiness of a future bachelor to conduct physical education and health activities with older people is to develop the bachelor as a creative person, switching him from the reproductive type of activity to an independent search for new methodological solutions. Therefore, it is necessary to include in the structure of readiness an organizational and methodological component – the ability to directly organize physical education and health activities of their wards, create groups of participants based on their interests, and develop recreational health programs. Reflexive readiness implies activity in the ability to correct one's actions, evaluate oneself and fellow students as subjects of professional activity. The specified components of readiness are interconnected and manifest themselves in a complex manner. In order to prepare future bachelors in the physical education and health field for professional activities with the elderly, the following may be included in the process of professional training: foreign language disciplines, the educational, methodological and informational content of which allow providing students with theoretical, reference and informational material from foreign sources; creating databases on foreign experience; developing and implementing projects taking into account the gerontological approach.

The following may be used as a substantive and technological form of preparing future bachelors in the physical education and health field for professional activities with the elderly: targeted enrichment of theoretical knowledge in the field of physical education and health activities, gerontology through digital technologies; participation of bachelors in research activities on this issue; involving them in professional activities during volunteering, using interactive methods, forms and techniques in teaching a foreign language (case studies, business games, analysis of problem situations, debates on this issue), ensuring the formation of the readiness of bachelors; providing assistance from the teacher in the learning process. The following issues are discussed in practical classes on the topic "My Future Profession", "My Studies", "Sports", "Country of the Studied Language": What are the motives of physical culture and recreation activities? What are its positive effects on the human psyche?How to popularize a healthy lifestyle and physical recreation among geronts? What effect does physical recreation have on optimizing the state of the body of an elderly person? To what extent does the physical culture contribute to the integration of people? How to ensure the actualization of gerontov's personal resources? What effect does it have on physical, intellectual, moral, creative development of personality? What cultural values are assimilated and developed in the process of physical culture and recreational activities? How physical recreation is organized, what means are used and who organizes it?

Conclusions. Retirement, narrowing of social circle, financial problems, and most importantly, deteriorating health - these are the main difficulties of the elderly. The key task of promoting and increasing the life expectancy of the elderly is to solve the issues of physical education, health, sports and preventive work with this group of the population. In turn, this activity requires a high level of theoretical and practical readiness of bachelors of physical education, including motivational-value, operational, organizational-methodical and reflexive components.

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References

1. Kryazhev V.D. Novyye fizkulturno-ozdorovitelnyye tekhnologii shkoly zdorovya dlya lits pozhilogo vozrasta. Vestnik sportivnoy nauki. 2012. No. 2. pp. 49-52.
2. Mosina O.A., Khazova S.A., Kilimnik A.A. Organizatsionno-pedagogicheskoye obespecheniye fizkulturno-ozdorovitelnogo napravleniya gerontoobrazovaniya. Fizicheskaya kultura, sport – nauka i praktika. 2019. No. 2. pp. 68-73.
3. «Strategiya deystviy v interesakh grazhdan starshego pokoleniya v Rossiyskoy Federatsii do 2025 goda». Available at: http://www.consultant.ru/ document/cons_doc_LAW_193464/5d9e3850559 b1caf4e-3868a4543e438fdb2ef60b/ (date of access: 11.06.2024).
4. Khazova S.A., Khashkhanok A.K. Podgotovka spetsialistov k fizkulturno-rekreatsionnoy deyatelnosti. Monograph. Maykop, 2008. 56 p.

The collaborative management of the ongoing professional growth of physical education instructors, grounded in the principles of the pedagogical quantori-um

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Abstract

Objective of the study was to create and theoretically support a model for the col-laborative management of the ongoing professional development of physical educa-tion instructors, utilizing a pedagogical quantorium as a foundation.

Methods and structure of the study. The research involved interviews with 25 heads of pedagogical quantories, 568 high school students and their parents, and 82 physical education teachers. This allowed us to evaluate the factors that influence professional choice, the acquisition of teaching skills, and the continuous professional development of teachers. Addition-ally, it provided insights into the effectiveness of the pedagogical quantarium in the field under investigation.

A new model of pedagogical quantum management was created – a model of collaborative management that involves the direct participation (inclusion, engagement) of all stakeholders in the management process. This model aims to foster the necessary development of physical education teachers.

Results and conclusions. Based on the examination of the operations of pedagogical quantories, it was observed:

a) the minimal utilization of the equipment accessible in the laboratory for the con-sistent advancement of physical educa-tion instructors;

b) the insufficient resources for instructional training that align with the peculiarities of physical education and student de-velopment;

c) the absence of resources and methods for professionally orienting schoolchildren towards pedagogical careers in the realm of physical education;

d) the lack of interaction with the parents of schoolchildren, applicants, and students.

The proposed model of integrated management can guarantee:

a) the continuity between all phases of continuous professional development for physical education instructors: selecting a teaching profession (schoolchildren), ac-quiring professional qualifications (students), and advanced training (practicing in-structors);

b) enhancing the quality of teacher education, formation, and professional develop-ment;

c) attracting talented older students to teaching activities.

Keywords: *pedagogical quantorium, associated management, physical education teachers.*

Introduction. Increased attention of the state and society to the health and physical development of children determines the need for high-quality selection, professional training and advanced training of physical education teachers, on whose professionalism the health of the nation largely depends. In order to implement the federal project «Teacher of the Future» of the national project «Education», by order of the Government of the Russian Federation dated December 31, 2019 No. 3273-r in educational institutions of higher pedagogical education, pedagogical technoparks «Quantorium» have been created and are functioning, which can have various focuses, including pedagogical. It should be noted that pedagogical quantoriums are equipped with high-tech equipment and means for training qualified personnel in the natural sciences and

technological spheres, they contain high potential for training and advanced training of physical education teachers. The effectiveness of pedagogical quantums is determined by the creation of a new, special system of continuous development of specialists, which will unite all stages of education: school – university – institutes (faculties) of advanced training. Such a large-scale project requires a new type of interaction of all participants in the educational process, the construction of new relationships between all interested parties, and as a consequence – the emergence of a new type of management – «connected management», which makes it relevant to develop a model of a new type of management of the required education of physical education teachers in the pedagogical quantum.

Objective of the study was to create and theoretically support a model for the collaborative management of the ongoing professional development of physical education instructors, utilizing a pedagogical quantorium as a foundation.

Methods and structure of the study. Before developing the model of coupled management, large-scale surveys were conducted, in which 25 heads of pedagogical quantoriums, 568 high school students and their parents, 82 physical education teachers of general education organizations took part. The forces of influence on professional choice, on motivation for high-quality mastering of educational programs of the university and advanced training depending on the age of students in the pedagogical quantorium were studied.

The model of a new type of management of a pedagogical quantorium – the model of coupled management determines the direct involvement (inclusion, interaction) of all subjects of educational relations in the management of the required development of physical education teachers.

Results of the study and discussion. The survey conducted by the heads of 25 pedagogical quantoriums (76% of the total number in the Russian Federation) showed that only 8 pedagogical quantoriums (32%) use equipment, teaching and educational tools to conduct practical classes in the preparation of physical education teachers, mainly in age-related anatomy, physiology and health culture, digital education technologies, most of which are in no way related to the main available equipment. At the same time, only 4 pedagogical quantoriums (16%) carried out advanced training for physical education teachers, and for schoolchildren, no pedagogical quantorium provided professional guidance related to the choice of the profession of a future physical education teacher. The survey of high school students, their parents and practicing teachers allowed us to record the existing dynamics of the influence of various factors on the continuous development of physical education teachers (see table).

It is obvious that in the process of maturation and professional growth of physical education teachers, some factors decrease their significance, while others increase. This pattern is the basis for choosing a new type of management as a system-forming principle – the principle of dynamic balance, which reflects the ongoing correction between the forces of influence of the subjects of educational relations.

The study of the few scientific developments in which conjugate management was analyzed (N.V. Kuzmina [1], A.A. Ostapenko [2], D.S. Tkach [4] and E.N. Rozhnova [3]), allowed it to be interpreted as “dynamic redistribution of forces of influence on pre-professional and professional activity of a person between the subjects of educational relations, while maintaining a dynamic balance and alignment of connections between them.” It should be noted that previously no integrated management of continuous development of physical education teachers has been developed, and no such management of pedagogical quantoriums has been developed, which represents the scientific novelty of the research.

Factors influencing the continuous development of physical education teachers (%)

Influencing factors	High school students	Students	Teachers
Parents	25-30	12-17	3-5
Small social groups	20-25	25-30	20-25
Teachers	15-20	18-28	10-15
Regulatory and legal acts	3-5	7-10	20-25
Individual personality traits	20-25	20-25	35-40
Psychologists-career guidance	7-10	3-5	0

It is obvious that the coupled management in the pedagogical quantum is a new type of construction of pedagogical interaction within the framework of the subject-subject paradigm, in which, to varying degrees and in different forms of manifestation, all subjects take on management functions, which allows for an increase

the effectiveness of pre-professional training, professional training and professional activities of physical education teachers, while effectively implementing their profes-sional formation, development and formation, starting with specialized psychological and pedagogical classes and ending with a system of advanced training. Based on the analysis of the relevant literature, a logical and content-based model of the coupled management of continuous education of physical education teachers was developed, including the following blocks:

1) Factors influencing the activities of the pedagogical quantum,

2) The control and controlled subsystems, the interaction of which is carried out through the system-forming principle of dynamic balance,

3) Scientific support for coupled management, consisting of: a) target guidelines (presented in the original matrix structure on two bases: vertically located goals (goals-orders, targets-programs, goals-projects) and horizontally located goals (subjects with different socio-professional roles, different ages and work experience: schoolchildren, students of a pedagogical university, practicing teachers); b) a meth-odological basis (represented by a synthesis of system-activity, competence and ac-meological approaches) and 3) a system of principles (equal rights in the process of cooperation; psychological safety of subjects of the educational process; planning and continuity of education of teaching staff; transparency, legality and professionalism; mutual respect and trust; mandatory implementation of the agreements reached);

4) Theoretical support, represented by such components as:

– direction of management interaction: vertical (management levels: communi-cative, functional, project) and horizontal (group values, traditions, norms of behavior and interaction are created)

– spheres of interaction (expert, representative, administrative-organizational, personnel, socio-psychological),

– functions of “associated management”: a) interpersonal interaction, b) deci-sion-making, c) motivational-target, d) planning-analytical, e) organizational-executive, e) control and evaluation.

5) Technological support, including two components: methodological (means, levels and methods of management) and organizational (stages and conditions of conjugate management);

- means of conjugate management: rational planning, rotation of teaching staff, generalization and dissemination of pedagogical experience, team building;

- levels of conjugate management - individual, group and sociological;

- methods of conjugate management represent the unity of several groups: motivational and stimulating, organizational and administrative, psychological and pedagogical, social (social influence).

- stages of continuous education: a) professionally oriented, b) cognitive and competence-based, c) professionally specializing.

- we see the following pedagogical conditions for continuous education of teaching staff: a) monitoring the results of conjugate management of continuous education of teaching staff; b) increasing the motivation of subjects of educational relations to develop their professional potential; c) coaching consulting on the development and implementation of an individual trajectory for professional growth of teaching staff.

6) The empirical support for the coupled management is represented by the evaluation and results component, consisting of criteria and indicators of the level of continuous development of physical education teachers, diagnostic methods and methods for processing the information received.

At each stage of continuous education of physical education teachers, we rec-ommend including in the educational process: a) modern general development pro-grams in cybersport and phygital sports; b) generative technologies of artificial intel-ligence [6], technologies of virtual and augmented reality [5] for understanding vari-ous sports through the creation of interactive atlases of sports facilities; c) additive technologies; d) training in various sports (football, tennis, boxing, etc.); d) operation of unmanned aerial vehicles.

Conclusions. It is noted that the innovative form of continuous pedagogical education has become the quantorium, designed to ensure the continuity of all stages of the educational system. The regularity of the dynamic change of the forces of influence on the professional development of physical education teach-

ers in accordance with age and professional growth is proven. The model of coupled management of the continuous development of physical education teachers is theoretically substantiated.

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References

1. Kuzmina N.V. Ponyatiye «pedagogicheskoy sistemy» i kriterii yeye otsenki. Metody sistemnogo pedagogicheskogo issledovaniya. N.V. Kuzmina [ed.]. Moscow: Narodnoye obrazovaniye publ., 2002. pp. 7-52.
2. Ostapenko A.A., Mishareva N.Yu., Paskevich N.Ya. et al. Sopryazhen-nyye obra-zovatel-nyye sistemy: modeli, struktura, vozmozhnosti. Shkolnyye tekhnologii. 2012. No. 6. pp. 41-59.
3. Rozhnova E.N. Sopryazhennoye upravleniye protsessom formirovaniya gotovnosti spetsialistov srednego zvena k upravlencheskoy deyatelnosti. PhD diss. abstract. Moscow, 2018. 25 p.
4. Tkach D.S. Sopryazhennaya obrazovatelnaya sistema professionalnogo pedagog-icheskogo obrazovaniya. Vestnik MGIMO-Universiteta. 2013. No. 1 (28). pp. 200-204.
5. Baxter G., Hainey T. (2020), Student perceptions of virtual reality use in higher education. Journal of Applied Research in Higher Education. Vol. 12. No. 3. pp. 413-424.
6. Fui-Hoon Nah F., Zheng R., Cai J., Siau K., Chen L. (2023). Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. Journal of Infor-mation Technology Case and Application Research. No. 25(3). pp. 277-304.

The potential of employing artificial intelligence and neural networks in the physical training of aikido practitioners

UDC 796.011:004

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Abstract

Objective of the study was to creation of a mobile application for Aikido practitioners, utilizing artificial intelligence technologies, and assessing its potential for physical training.

Methods and structure of the study. The academic and methodological literature on the application of artificial intelligence in Aikido, physical education, and sports is examined. A mobile application has been created using AI technology to tailor training programs to individual needs. A theoretical assessment of the potential efficacy of the developed application is conducted.

Results and conclusions. The innovative mobile application has proven its ability to tailor training programs based on data analysis and user self-evaluation. Theoretical analysis has revealed that an application with artificial intelligence can adjust training loads, minimizing the risk of overtraining. The current version of the app has some drawbacks, such as a limited number of exercises. The next stage of development will involve adding automatic exercise counting using computer vision.

Keywords: *physical training, artificial intelligence, mobile application, personalization of training, aikido, GTO standards.*

Introduction. Physical training plays an important role in aikido and is one of the components of effective performance of technical techniques [3]. In this study, aikido is considered as a system of general physical training, including endurance, flexibility, coordination of movements, speed and strength. According to the order of the Ministry of Sports of the Russian Federation dated November 16, 2022 No. 993 "On approval of the federal standard of sports training in the sport of aikido"[1], physical training of aikido practitioners includes both general and special. The standard establishes indicators of physical fitness of practitioners, the level of development of which can also be assessed using the GTO standards.

For the effective organization of aikido classes, it is necessary to take into account the individual characteristics of the practitioners. At the same time, modern technologies can significantly optimize the process of physical training. The use of artificial intelligence (AI) in mobile applications allows you to create personalized training programs that take into account the individual capabilities of the user [4]. The integration of these technologies into the aikido training process can significantly increase the effectiveness of physical training [1, 2].

The relevance of the study is due to the need for effective tools for independent training, the need to take into account the individual characteristics of the practitioners and an objective assessment of progress based on specific data.

Objective of the study was to creation of a mobile application for Aikido practitioners, utilizing artificial intelligence technologies, and assessing its potential for physical training.

[1]Prikaz Ministerstva sporta RF ot 16 noyabrya 2022 g. № 993 «Ob utverzhdenii federalnogo standarta sportivnoy podgotovki po vidu sporta «aykido».

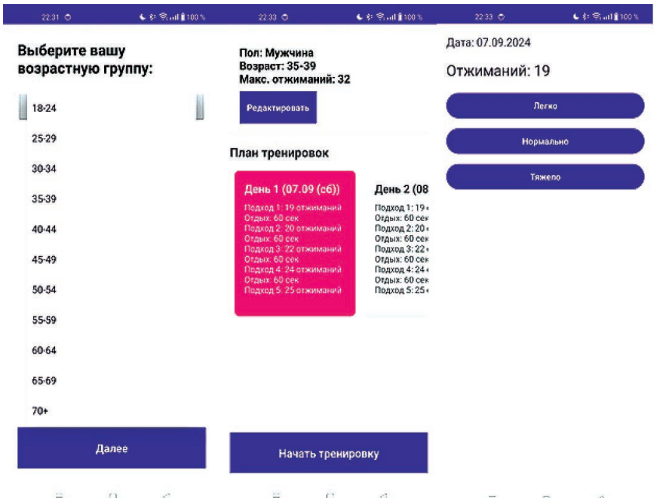
Methods and structure of the study. The following methods were used: analysis of scientific and methodological literature on aikido, physical education and the use of AI in sports; analysis of existing mobile applications using neural network technologies for physical training; development of a mobile application based on AI for aikido. To solve the problem, we have developed a mobile application that allows testing the capabilities of AI in the physical training of aikido practitioners. The current version of the mobile application includes training in only one exercise – «bending and unbending the arms in a prone position». This approach allows us to focus on debugging the algorithms of artificial intelligence and the user interface. This is necessary to create a reliable software platform for further development. The exercise «bending and unbending the arms in a prone position» was chosen for several reasons. Firstly, this exercise is included in both the Federal Standard for Aikido and the GTO complex, which makes it possible to use standardized evaluation criteria. Secondly, this is a basic exercise for developing strength and strength endurance of the upper body, which is important for performing technical techniques in aikido. In the future, the exercise base will be expanded to cover all aspects of physical training in Aikido and will include exercises aimed at developing speed, flexibility and coordination of movements.

The user interface of the application consists of three main screens (Fig. 1):

- Start screen: collects initial information about the user;
- Main screen: displays the current training plan;
- Workout screen: displays the current exercise and the number of repetitions. And also collects feedback after completing the approach.

The application's operation algorithm:

- when the application is first launched, the user is asked to enter initial data about themselves (age, gender, level of physical fitness);
- based on the entered data, a training plan is created taking into account the GTO standards;
- the user is shown the training plan on the main screen;
- in training mode, the user is shown the current task, after each approach, the user must assess the difficulty of the exercises;
- the AI system, if necessary, changes the training plan, depending on the number of exercises performed, the user's progress and the difficulty ratings of the exercises performed by the user.



Screens of a mobile application for physical training of aikido practitioners

Results of the study and discussion. The developed application provides for the principle of gradual addition of functionality. At the current stage, the main focus was on the development of strength qualities. The main task is to integrate artificial intelligence technologies into the training process so that it is responsible for the personalization of training programs, analyzes user progress and adapts to loads.

This approach is in line with modern trends in sports technology. Research shows that the use of AI in fitness applications opens up wide opportunities for optimizing the training process and improving athletic performance [4, 5]. E.L. Tagirova and V.V. Tagirova argue that AI-based information systems will allow more accurate analysis of large volumes of data on athletes and their training [4]. This is especially relevant for our application, which collects large volumes of data on the user and then analyzes the data obtained.

H.A. Tokhoyan notes the potential of AI for personalizing training programs and predicting results [5]. Our application implements this idea by adjusting the training program taking into account individual indicators and the complexity of the exercises.

Analysis of the developed application shows a number of potential opportunities. The creation and adjustment of training programs is individual for each user, this will increase the efficiency of developing physical qualities compared to traditional training programs. Adaptive systems for timely changes in physical activity, based on user feedback, can reduce the risk of overtraining. The application gives users more freedom in choosing a place for training. And artificial

intelligence provides a more accurate and objective assessment of progress by analyzing large amounts of data and indicators that are inaccessible to traditional training methods. Despite these advantages, it is important to critically evaluate the developed application and determine directions for its further development. During the analysis, potential limitations of the developed application were identified. At the current stage, work is implemented with only one exercise and this does not allow developing all the physical qualities necessary in aikido. In addition, the use of AI in sports applications is associated with a number of challenges [7]. In the context of our application, this is the lack of visual control over the technique of performing exercises. It is also important to note that the adaptation of the training program largely depends on the accuracy of the user's self-assessment. To overcome these limitations, it is planned to use automatic repetition counting using computer vision technology. In the study of Yu.V. Churakova and A.V. Mikheeva confirmed the effectiveness of using neural networks for automatic control of physical exercises in mobile applications [6].

Conclusions. As the analysis of the functional capabilities of the developed application for physical training of those involved in aikido shows, it opens up new prospects for further individualization and personalization of training sessions, allows improving control and self-control over the exercises performed and can be considered as a comprehensive tool in the physical training of those involved in aikido. The created application has the ability to further improve its functionality, such as expanding the set of exercises for the development of almost all types of physical qualities: strength, speed, coordination of movements, endurance, necessary for aikido. In the future, it is envisaged to integrate such functionality into the application as computer vision, which will allow evaluating not only the quantitative aspects of the exercises performed, but also the technique.

References

1. Bobkova E.N., Parfianovich E.V. Primeneniye neyronnykh setey dlya prognozirovaniya i modelirovaniya trenirovochnogo protsessa v legkoy atletike. Chelovek. Sport. Meditsina. 2018. Vol. 18. No. S. pp. 115-119.
2. Korobko Yu.V. Perspektivy primeneniya iskusstvennogo intellekta v fizicheskom vospitanii. Problemy avtomatiki i upravleniya. 2022. No. 1 (43). pp. 115-129.
3. Mironov A.G. Kharakteristika aykido kak vida yaponskogo boyevogo iskusstva i sredstva fizicheskogo vospitaniya. Vestnik Chuvashskogo gosudarstvennogo pedagogicheskogo universiteta im. I.Ya. Yakovleva. 2011. No. 3-1(71). pp. 126-133.
4. Tagirova E.L., Tagirova V.V. Iskusstvennyy intellekt i sport, vozmozhnosti i perspektivy. Sovremennyye problemy fizicheskoy kultury i sporta. Proceedings of the XXVI All-Russian scientific-practical conference, Khabarovsk, November 25-26, 2022. E.A. Vetoshkina [ed.]. Khabarovsk: Dalnevostochnaya gosudarstvennaya akademiya fizicheskoy kultury publ., 2022. pp. 234-237.
5. Tonoyan Kh.A. Ispolzovaniye iskusstvennogo intellekta v sportivnoy deyatelnosti. Uchenyye zapiski universiteta im. P.F. Lesgafta. 2024. No. 2(228). pp. 184-189.
6. Churakov Yu.V., Mikheev A.V. Ispolzovaniye neyrosetey v mobilnom prilozhenii dlya avtomaticheskogo otslezhivaniya fizicheskikh uprazhneniy. Tsifrovaya transformatsiya fizkulturnogo obrazovaniya i sfery fizicheskoy kultury i sporta. Proceedings of the All-Russian scientific-practical conference with international partcipation. Izhevsk: Udmurtskiy universitet, 2023. pp. 337- 344.
7. Sperlich B., Düking P., Leppich R., Holmberg H.-C. (2023). Strengths, weaknesses, opportunities, and threats associated with the application of artificial intelligence in connection with sport research, coaching, and optimization of athletic performance: a brief SWOT analysis. Front. SportsAct. Living 5:1258562. doi: 10.3389/fspor.2023.1258562

Technologies for gamification of physical culture, recreation and sports activities in a virtual sports club

UDC 796.011:004

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Abstract

Objective of the study was to generalization of experience and transfer of knowledge of the theory of virtuality in the field of physical culture, recreation and sports activities, as well as the development of gamification technology for home training of children.

Methods and structure of the study. The research was conducted by synthesizing theoretical insights and practical expertise from virtual entities. The methods employed included: a review of scholarly and methodological literature, a content analysis and conceptualization, the application of gamification, the development of mobile app technology, and the utilization of neural networks.

Results and conclusions. Based on the examination of scientific literature, a comprehensive definition of a virtual school sports club is formulated, highlighting its key characteristics and content. A model of a virtual martial arts sports club named "Sokol" in Izhevsk, with an informal structure, has been developed. The paper describes the creation of a gamification application that enables the use of devices for physical education and sports activities, thereby enhancing the child's motivation and interest in training. These innovations are designed to enhance physical education and sports activities, improve children's physical fitness, and foster the development of children's associations.

Keywords: *gamification, virtual sports club, virtual technologies in training, sportization, virtual organization, mass sports.*

Introduction. According to the order of the Government of the Russian Federation of January 23, 2021 No. 122-r, as part of the complex of events "Decade of Childhood"1 by 2027, it is planned to implement key socially significant initiatives, including: increasing the coverage of children aged 5 to 18 years with additional education; improving physical education and sports work and increasing the level of physical fitness of children; developing children's associations; organizing and conducting scientific research on modern childhood, from the perspective of which this study is conducted. Currently, in the period of digitalization of all spheres of society, the concept of "virtual" is becoming increasingly relevant and in demand, such definitions as "virtual reality", "virtual money", "virtual business centers", "virtual technologies", etc. appear, thus, an innovative and promising structural direction is being formed in the field of economics and business – "virtual organizations" [3, 4, 5, 6]. This direction is closely related to information and communication technologies and is based on network business interaction. In the field of physical education and sports (PES), the direction of "virtual organizations", "virtual public associations and clubs" is practically absent, not considered, not studied and, therefore, its development is a very urgent task.

Objective of the study was to identify and substantiate the essence and content of the concept of "virtual sports club" and the virtual technology of "gamification" in physical culture, recreation and sports activities.

Methods and structure of the study. The scientific work was carried out on the basis of generaliza-

[1] Order of the Government of the Russian Federation No. 122-p of January 23, 2021: "Plan of the main events held within the framework of the Decade of Childhood".

tion of theoretical knowledge and practical experience of functioning of virtual organizations, the following methods were used: content analysis and definition of concepts, gamification, technology of creation of mobile application, neural network. Many experts claim that the future is in transferring business to online mode, in virtual organizations [5, 6]. In modern scientific literature there are various definitions of the concept of "virtual business organization" [3, 4, 6]. Thus, O.E. Kalenov [3] gives the following definition: A virtual organization is a formal or informal organization that unites spatially separated economic entities (legal entities and individuals) that interact in the process of joint activities for the purpose of manufacturing products, providing services and obtaining maximum profit, using mainly information and communication technologies.

Results of the study and discussion. In the field of physical education and sports, there are public associations of legal organizations – these are ***federations, associations,*** etc. – ***organizations with a formal structure*** and strong centralized management, with rigid vertical connections and weak horizontal interactions, the financing of which is based on membership fees, and the activities are very often aimed at organizing paid services for students in the training, educational and competitive processes.

The practice of the "noughties" and "tenths" showed that not all clubs, sections and even regional federations are satisfied with such structural and managerial functioning. Legal and physical entities want more freedom, more independence, the ability to plan their health and sports activities based on local regional characteristics. Thus, it is clear that the reasons and prerequisites for the emergence of virtual organizations in the field of physical education and sports are emerging.

Virtual web organizations in the field of physical education and sports. In essence, these are web services that provide health and training online services for real registered users from anywhere in the world on a paid basis. Let's outline some of them:

"Onetrack" (Available at: https://www.onetrack.club/) is a virtual club for people who run. Members are provided with interactive training plans and have access to daily live sessions led by an expert trainer in audio or video formats.

"Fitocracy" (Available at: https://www.fitocracy.com/) is a service that allows you to choose your own virtual trainer for fitness classes, assesses the level of physical fitness of a club member, creates a nutrition plan, organizes operational control over the training process and user achievements (points are awarded for training and interactive progress graphs are provided).

Virtual school sports club. Based on the content analysis of works on the definition of a virtual organization, carried out by the authors L.A. Leinonen, 2009 [4]; M.A. Kurmanbaeva, I.V. Chizhankova, 2017; O.E. Kalenov, 2018 [3]; I.E. Khromov, 2018 [6]; G.I. Gumerova, E.Sh. Shaimieva, 2018; M.S. Sudakov, A.O. Kondrat, M.I. Danilenko, 2019 [6] and others, we formulated the following generalized definition, in the context of the field of physical education and sports: "Virtual school sports club" (VSSC) [2] is a virtual informal or semi-formal organization, without the formalization of a traditional organizational and legal structure, permanently or temporarily uniting various entities (legal entities - sections, clubs - and / or individuals), the functioning of which is based on network interaction and is aimed at implementing physical education, health and sports activities (PEHS).

Let's consider the main features and content of VSSC:

1. Low level of formalization. An informal sports organization is, to some extent, a spontaneously created association of clubs, sections, without concluding organizational and legal agreements, to achieve certain common goals (not profit) in physical education, health and sports activities. Such fundamental goals are the reason for the creation and existence of both formal and informal organizations [1]. The VSHSK is, in essence, a club without borders.

2. Decentralized management, priority of horizontal interaction links, and also, perhaps, the presence of a virtual core – an organization around which cooperation takes place.

3. Temporality of cooperation, i.e. project-based nature of interaction for the implementation of common goals for all entities.

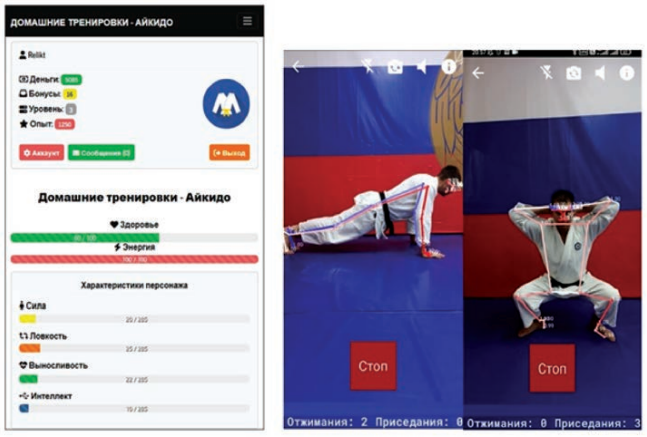
4. Network interaction of all VSSC entities.

5. Communication via information technologies, as well as the use of virtual technologies, such as gamification, in physical education, health and sports activities.

"Gamification" is a virtual technology for physical education, health and sports activities.

We offer gamification technology – a computer application for home training of children, aimed at increasing their motivation and interest in participating in the training process. The main goal of the application is to create an exciting and motivating environ-

ment for home training. The developed application is intended for people involved in martial arts. The user creates and develops a virtual character that accumulates experience and increases levels as they perform physical exercises (Figure a). For performing exercises and achieving various goals, users receive virtual currency that can be used to "improve the virtual character" and purchase various in-game items. The reward system allows users to indirectly evaluate the results of their efforts. This approach encourages the user to train regularly and ensures visible progress in physical fitness.



A B

Visualization of some aspects of the gamification application: a) interface of the character progress system; b) control of exercise performance using a neural network

The application also allows you to implement:

1. Competitive mode - where the user can compare their achievements with the results of other participants.

2. Virtual battles - where the user can fight both with each other and against computer-controlled opponents. To successfully repel attacks, users must regularly perform physical exercises that strengthen their characters and increase their chances of winning. This mechanism additionally encourages users to train regularly and helps improve their physical fitness.

The application includes a function for monitoring the correctness of exercise performance using a smartphone camera and artificial intelligence technologies, developed by Yu. V. Churakov and A. V. Mikheev [7]. The check is carried out both by a virtual trainer and a built-in neural network, which ensures the accuracy and objectivity of the assessment (Figure 2. b).

Conclusions. In the field of physical culture and sports, an innovative and promising structural direction is being formed and developed – "virtual sports club", "virtual public associations", and virtual technologies in the field of physical education and sports, such as gamification, are being developed. These innovations are aimed at improving physical education and sports work, increasing the level of physical fitness of children, and developing children's associations. Virtual sports organizations are designed to ensure the flexibility of their functioning, mass participation and sportification of physical education of those involved. The development and implementation of gamification technology allows using devices for the purposes of physical education and sports, creating motivation and increasing the child's interest in training.

References

1. Bychkova A.A., Potekhina E.V. Problemy sochetaniya formalnogo i neformalnogo v sotsialnoy organizatsii. Aktualnyye voprosy ekonomichskikh nauk, 2008. No. 2. pp. 11-15.
2. Dmitriev O.B., Sterkhov D.A. Konvergentsiya kontseptsii «sportizatsiya» i proyekta «shkolnyy sportivnyy klub» kak innovatsionnoye napravleniye v fizkulturno-sportivnoy sfere. «Sport, chelovek, zdorovye». Proceedings of the XI International Congress. St. Petersburg: POLITEKH-PRESS publ., 2023. pp. 477-479.
3. Kalenov O.E. Kharakteristiki i osobennosti virtualnykh organizatsiy. Vestnik REA im. G.V. Plekhanova, 2018. No. 5 (101). pp. 117-123.
4. Leynonen L.A. Osnovy teorii virtualnykh organizatsiy. Izvestiya SPbGEU, 2009. No. 1. 4 p.
5. Sudakov M.S., Kondrat A.O., Danilenko M.I. Virtualnyye organizatsii. Benefitsiar publ., 2019. No. 34. pp. 18-21.
6. Khromov I.E. Virtualnaya organizatsiya kak novaya organizatsionnaya forma upravleniya predpriyatiyem. Ekonomicheskiye nauki, 2018. No. 8 (165). pp. 65-69.
7. Churakov Yu.V. Ispolzovaniye neyrosetey v mobilnom prilozhenii dlya avtomaticheskogo otslezhivaniya fizicheskikh uprazhneniy. Tsifrovaya transformatsiya fizkulturnogo obrazovaniya i sfery fizicheskoy kultury i sporta. Proceedings of the All-Russian scientific-practical conference with international participation. Izhevsk: Udmurtskiy universitet, 2023. pp. 337-344.

Development of coordination and speech abilities of children with speech disorders

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Keywords: *children with speech disorders, coordination qualities, speech development, neuro-kinesiological games and exercises, breathing exercises.*

Relevance. Currently, the number of speech disorders in primary school children is steadily increasing. According to the results of the annual survey of children in the Republic of Tatarstan, there is a tendency to increase the number of students with general speech underdevelopment. For example, in the 2015-2016 academic year, 46% of children with speech disorders were identified from the total number of applicants, in the 2019-2020 academic year - 48% of children, in the 2021-2022 academic year – 52% of children, and in 2023-2024 - 54% of the total number of applicants. The constant growth in the number of children with developmental disabilities highlights the importance of correctional and preventive work in schools. Therefore, the development of physical qualities and speech correction is currently an urgent topic [1].

The purpose of the study: is to theoretically and experimentally substantiate the methods of adaptive physical education of younger schoolchildren with speech disorders through the use of neuro-kinesiological games, special and breathing exercises.

The results of the study and their discussion. The results of the study and their discussion. Taking into account the identified features of the development of coordination abilities and speech, a method of adaptive physical education of younger schoolchildren with speech disorders has been developed, consisting of six interrelated blocks: Block I – neurokinetic exercises without objects, block II - neurokinetic exercises with small balls with spikes, block III – neurokinetic exercises with large balls on a balancing board of Bilgu, block IV - neurokinetic games, block V - breathing exercises, block VI - relaxation and stretching exercises. The experimental technique was tested in a pedagogical experiment for 12 months. At the end of the pedagogical experiment, the indicators characterizing the prosodic side of speech (reproduction of rhythm, intonation, tempo of speech) improved in the control group from 26.3% to 31.8%, in the experimental group - from 76.1% to 83.3%. Kinesthetic practice increased in both study groups of children with dysarthria: in the control group - by 35.2%, in the experimental group - by 93.7%. A study of dynamic coordination of articulatory movements in children with dysarthria in both groups after the experiment showed improved results in both groups. The increase was higher in the experimental group (1.9 points (126.6%)) compared with the control group - 0.6 points (37.5%). During the pedagogical experiment, the estimates of the kinetic basis of hand movements in the control and experimental groups also improved by 0.4 points (26.6%) and 1.8 points (128.6%), respectively. An improvement in EG results was also observed in indicators assessing the state of coordination abilities, from 22% to 67%.

Conclusion. Thus, the introduction of an experimental technique using neurokinetic exercises and games in extracurricular activities allowed us to establish significant differences between the groups in all the tested indicators, the increase in the experimental group ranged from 21% to 40 %.

References

1. Kasmakova, L. E. Neuro-kinesiological exercises and games in the development of coordination and speech abilities of younger schoolchildren with speech disorders / L. E. Kasmakova / / science and sport: current trends. – 2024. – Vol. 12, No. 1. pp. 136-143. – DOI 10.36028/2308-8826-2024-12-1-136-143. – EDN MGMBOE.

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The effect of wellness training on specialized simulators on the psychophysical state of middle-aged peopl

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Keywords: *specialized simulators, wellness training, mental and physical condition, average age.*

Relevance. Water training using specialized simulators is one of the modern safe ways to improve your health. These specialized exercise machines use the unique properties of water to strengthen the cardiovascular system, muscles, increase flexibility and improve coordination of human movements, offering many physiological benefits that traditional exercises on land do not provide [1].

The purpose of the study: to study the effect of recreational training in the water using specialized AquaGym simulators on certain indicators of the psychophysical state of middle-aged people.

The results of the study and their discussion.

The study involved 32 people who were engaged in wellness workouts in the water simulators.. Analyzing the results of the survey of respondents, the following generalizations can be made:

– age of respondents: 50-59 years old (37.5%), 40-49 years old (31.3%) 30-39 years old (15.6%), 60 years and older (15.6%);

– duration of classes: from 6 to 12 months for 31.3% of respondents; from 1 to 2 years for 28.1%; less than 6 months for 25%; more than 2 years for 15.6%;

– number of classes per week: 2-3 times for 46.9% of respondents, 4-5 times -25%, once a week - 18.8%;

– the physical condition before the start of classes was assessed as: "satisfactory" by 31.3% of respondents, "good" by 21.9%, "bad" by 25%, "very bad" by 12.5%;

– the physical condition after the experiment was assessed as: "good" by 37.5% of respondents, "excellent" by 28.1%, "bad– by 9.4%, "very bad" by 3.1%;

– Among the respondents, 46.9% of people felt a significant improvement in their well-being; 31.3% felt a slight improvement, and 21.9% noted no changes.%;

– respondents indicated the following changes: muscle strengthening in 37.5% of people, improved flexibility in 25%, stress reduction in 18.8%, cardiovascular fitness in 18.8%.

– the effectiveness of using simulators is assessed as: "very effective" by 31.3% of people, "effective" by 46.9%, "neutral" by 21.9%;

– the main motivation for continuing studies is: improved health for 56.3% of respondents, comfortable conditions for 18.8%, the opportunity to communicate with other participants for 15.6%;

– 46.9% of respondents would like to see more diversity in classes, and 31.3% would like to see an increase in the number of classes.

Conclusion. Summarizing the above arguments, we can say that wellness workouts in the water using specialized simulators have a positive effect on the psychophysical state of middle-aged people.

References

1. Petrea A., Malousaris G. AquaGym exercises contribution at the health of adults // The annals of the «Stefan cel mare» University. 2012. p. 9-17.

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The physical and biological constraints that hinder the development of physical abilities and energy reserves in elite kayakers and canoeists

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Abstract

Objective of the study was to investigation of medical and biological factors that could impede the enhancement of the training performance among elite kayakers and canoeists.

Methods and structure of the study. The results of 18 series of own monitoring of the current functional state of highly skilled kayakers and canoers over six years (2019-2024) are summarized. In total, 43 male rowers aged 18 to 36 years (5 HMS, 8 MSIC, 27 MS, 3 CMS) and 23 female rowers aged 18 to 33 years (2 HMS, 4 MSIC, 15 MS, 2 CMS) took part in the research. Current changes in the morphological, protein and biochemical composition of blood were analyzed (antistreptolysin-O content, hemoglobin concentration, total protein content, albumin concentration, glucose, lymphocyte content at leukocyte levels from 4,5 to 7,5*109/l, hemodynamic parameters and electrocardiogram (total number of records 1360), criteria for the functional state of the autonomic nervous system, as well as sleep disorders according to a simplified scheme of the SAN questionnaire (assessment of athletes on a 5-point scale of sleep status, appetite and desire to train).

Results and conclusions. It was discovered that a significant number of athletes in the selected group experienced negative shifts in their parameters, with these shifts occurring in 20 to 80% of measurements. These shifts were often associated with underlying conditions such as chronic infections, central nervous system fatigue, pre-anemic states, protein deficiencies, and more.

Therefore, to address the issue of personalizing and enhancing the training process for elite kayakers and canoeists, it is crucial to identify and address their individual medical and biological risk factors.

Keywords: *morphological and biochemical composition of blood, highly skilled canoeists and kayakers, training process, negative changes, detection rate.*

Introduction. The current model of individualization of the training process for highly and highly qualified athletes is based, as a rule, only on the results of a comparative analysis of its main characteristics with those of either leading domestic and foreign athletes, or of a selected athlete in successful and unsuccessful seasons. We are talking about the organization of the training process, the content of training tools, as well as their distribution and ratios in each of the mesocycles of the annual training cycle. As for the analysis of other pedagogical, as well as psychological and medical-biological factors, which even against the background of adjusted training loads may not allow the fully realized physical qualities and energy potential of the body to be developed, the question remains open.

Objective of the study was to investigation of medical and biological factors that could impede the enhancement of the training performance among elite kayakers and canoeists.

Methods and structure of the study. The results of 18 series of our own monitoring of the current functional state of highly qualified kayakers and canoeists over a period of six years (2019-2024) were analyzed. A total of 43 male rowers aged 18 to 36 years (5 HMS, 8 MSIC, 27 MS, 3 CMS) and 23 female rowers aged 18 to 33 years (2 HMS, 4 MSIC, 15 MS, 2 CMS) took part in the research. The current changes in the param-

eters of the morphological, protein and biochemical composition of the blood (antistreptolysin-O content, hemoglobin concentration, total protein content, albumin concentration, glucose, lymphocyte content with a leukocyte level of 4.5 to 7.5 * 109 / l), hemodynamic parameters and electrocardiogram (total number of records 1360), criteria for the functional state of the autonomic nervous system, as well as sleep disorders according to a simplified scheme of the SAN questionnaire (assessment by an athlete on a 5-point scale of sleep, appetite and desire to train) were analyzed.

Blood analysis was carried out at the bases of the consultative and diagnostic center of the Research Institute-KKB No. 1 named after Ochapovsky (Krasnodar) and the State Budgetary Healthcare Institution "Center for Public Health and Medical Prevention" of the Ministry of Health of the Krasnodar Territory.

Negative shifts in blood parameters were determined by several gradations presented in the works [4, 6, 9]. In two of them [4, 6], the results were based on data obtained during examination of highly and highly qualified kayakers and canoeists.

The determination of the frequency of myocardial repolarization disorders in athletes was based on the criteria presented in the work of L.A. Butchenko and V.L. Butchenko [2].

Results of the study and discussion. As shown by the analysis of literary sources and the results of our own long-term observations, the following can be primarily attributed to the medical and biological risk factors for a decrease in the effectiveness of the training process in the selected contingent of athletes: the presence of insufficiently sanitized foci of chronic infection; chronic physical overstrain of the central nervous system; chronic physical overstrain of the cardiovascular system; insufficient consumption of carbohydrates and/or proteins, iron deficiency (and, as a consequence, a decrease in the hemoglobin content in the blood); violation of the drinking regime (chronic fluid deficiency); borderline states of the digestive and urinary systems; stable hypertonicity of certain muscles and muscle groups (training conducted against the background of hypertonic muscles generates greater physiological stress during submaximal loads); long-term registration long before the competitive period of the adaptation phase of reactivation by the percentage of lymphocytes in the blood, etc. [10, 11].

The data obtained in this work regarding a number of the above-mentioned risk factors are presented in the table.

As follows from the presented results (see table), in 31,2% of measurements an elevated level of antistreptolysin-O is recorded (from 211,0 U/l to 1930,2 U/l in men, from 205,1 U/l to 1029,2 U/l in women), which, as is known, is a criterion for sensitization of the body to streptococcal antigens (the titer of antibodies to group A beta-hemolytic streptococcus increases a week after the onset of infection, reaches a peak after 3-5 weeks and in some cases decreases to normal only after six months to a year) [14]. That is, a significant number of athletes train against the background of intoxication associated with foci of chronic infection (most often in the ENT organs), which, naturally, cannot but have a negative impact on the effectiveness of

Frequency of detection of negative shifts in registered parameters in highly qualified rowers on kayaks and canoes

Registered parameters (number of measurements)	Parameter values related to negative shifts	Percentage of violations
Hemoglobin concentration, men (324), g/l	< 138	21,3
Hemoglobin concentration, women (40), g/l	< 129	20,0
Lymphocyte content, men (50), %	> 45	22
Total protein content, men (293), g/l	<70,4	26,2
Total protein content, women (43), g/l	< 69,7	58,1
Albumin concentration, men (21), g/l	< 44, 6	33,3
Glucose concentration, men and women (55), mmol/l	< 4,5	80
Antistreptolysin-O content, men	> 200	31,2
and women (93), U/l	< 4	32,3

the training process. 32,3% of measurements indicated sleep disturbances in rowers, which is, according to modern concepts [10, 11], one of the most informative markers of central nervous system overstrain.

Of the 28 rowers, 14 people (55,0%) had a stable normal electrocardiogram, 6 (21,5%) had a stable pathological one, and 8 (21,5%) had one with periodic improvement or deterioration. Among women, out of 18 athletes, 10 people (55,5%) had a stable normal electrocardiogram, 3 (16,7%) had a stable pathological one, and 5 (27,8%) had one with periodic improvement or deterioration. That is, it is reasonable to assume that only 55% of athletes have a high level of tolerance to physical activity, which is a necessary condition for improving athletic skills. As for the results of monitoring the fairly stable morphological and biochemical blood composition indicators in this contingent of athletes (hemoglobin concentration, white blood cell count and total protein content recorded after 40 hours of the post-load period), the following data are noteworthy. In 21,3% of measurements of male athletes, the hemoglobin content in the blood was below 138 g/l, while in females, its values below 129 g/l were observed in 20,0% of cases.

Total blood protein content below 70,4 g/l was recorded in 26,2% of measurements in males and below 69,7 g/l in 58,1% of cases in females. Blood albumin concentration below 44,6 g/l was recorded in 33,3% of measurements in male athletes

Blood lymphocyte content above 45% (which corresponds to one of two variants of the adaptation phase of reactivation [3, 12]) 1.5 months before the first competition of the season was noted in 22% of measurements in males.

Blood glucose concentration below 4,5 mmol/l was recorded in 80% of male and female rowers. In one series, it was below 4,1 mmol/l in 22,6% of men and 33,3% of women.

The influence of hemoglobin content in the blood on the level of aerobic capacity of the body, and primarily aerobic efficiency, has long been generally recognized [8, 12]. Regarding the significance of albumin concentration indicators in this regard (unfortunately, this parameter is not always recorded), total protein content and, accordingly, the albumin-globulin coefficient, they are convincingly proven in the work [5] from the standpoint of maintaining (especially when it comes to the albumin level) oncotic pressure and, accordingly, the volume of circulating blood, the transfer of a number of substances and, in particular, carbohydrates and lipids, which are the main energy substrate for muscle activity, regulation of hormonal functions, etc. The authors of the work [16] pay special attention to the diagnostic significance of repeated decreases in blood glucose levels, who, in an attempt to find a possible cause for the occurrence of a state of non-functional overstrain / overtraining syndrome, analyzed 6 metabolic schemes and came to the conclusion that only the theory of carbohydrate metabolism disorder is most relevant, and the trigger in this regard can even be single workouts against the background of a clear tendency to hypoglycemia.

As for the functional state of the musculoskeletal system in kayakers and canoeists, its dynamics (in the absence of complaints) are practically not assessed within the framework of current monitoring today, although, judging by the works [1, 13], representatives of these sports specializations have fairly frequent disorders in the form of muscle imbalances, stable muscle hypertonus, skin-fascial fixations, painful muscle compactions, functional blocking. In addition, the vast majority of rowers have microalbuminuria [15] and pathology of the digestive system, [7]).

Conclusions. Thus, according to the data obtained, the solution to the problem of individualization and increasing the effectiveness of the training process for highly qualified kayakers and canoeists should begin with the identification and subsequent elimination of their individual medical and biological risk factors that prevent them from reaching the desired level of feasibility of the physical qualities and energy potential of the body.

References

1. Al-Bukai M.Kh. Fiziologo-biomekhanicheskiye faktory, obuslovlivayushchiye gipertonus myshts u sportsmenov. PhD diss. abstract. Krasnodar, 2004. 20 p.
2. Butchenko L.A., Butchenko V.L. Varianty normy segmenta RS-T elektrokardiogrammy sportsmena. Teoriya i praktika fizicheskoy kultury. 1984. No. 11. pp. 40-42.
3. Garkavi L.Kh., Kvakina E.B., Ukolova M.A. Adaptatsionnyye reaktsii i rezistentnost organizma. Rostov-on-Don, 1990. 223 p.
4. Grishina Zh.V., Makarova G.A., Chernukha S.M. et al. Osobyy podkhod k analizu i otsenke sostava krasnoy krovi u sportsmenov (na primere grebli na baydarkakh i kanoe). Sportivnaya meditsina: nauka i praktika. 2021. No. 4. pp. 26-32.

5. Kalinin A.N. Osobennosti morfologicheskogo i belkovogo sostava krovi u vysokokvalifitsirovannykh sportsmenov, spetsializiruyushchikhsya v greble na baydarkakh i kanoe. PhD diss. Krasnodar: KGUFKST publ., 2008. 115 p.
6. Karpov A.A., Makarova G.A., Pogrebnoy A.I. et al. Problema informativnoy tsennosti traditsionnogo kompleksa biokhimicheskikh kriteriyev, registriruyemykh v ramkakh tekushchego kontrolya za sportsmenami vysshey kvalifikatsii. Vestnik sportivnoy nauki. 2019. No. 5. pp. 72-78.
7. Komarova T.K. Funktsionalnoye sostoyaniye sistemy pishchevareniya u sportsmenov: faktory riska i skrytaya patologiya. Fiziologiya i sportivnaya meditsina. 2009. No. 4. pp. 50-52.
8. Kots Ya.M. Krov (gemoglobin i myshechnaya rabotosposobnost). Guidelines. Moscow, 1980. 35 p.
9. Makarova G.A., Grishina Zh.V., Chernukha S.M. et al. Tsentilnyye gradatsii morfologicheskikh i biokhimicheskikh pokazateley krovi: osobyye podkhody k analizu i otsenke. Lechebnaya fizkultura i sportivnaya meditsina. 2020. No. 1. pp. 14-21.
10. Makarova G.A., Vinogradov M.A., Deshin R.G. et al. Vrachu sportivnoy komandy: otdelnyye aspekty professionalnoy deyatelnosti. Moscow: Sport publ., 2024. 288 p.
11. Makarova G.A., Avdeeva M.G., Bezuglov E.N. et al. Osnovy mediko-biologicheskogo obespecheniya podgotovki sportsmenov. Handbook of the trainer. Moscow: Printleto publ., 2022. 512 p.
12. Makarova G.A., Loktev S.A. Kartina krovi i funktsionalnoye sostoyaniye organizma sportsmenov. Krasnodar, 1990. 125 p.
13. Mints E.I. Fiziologo-biomekhanicheskiy analiz funktsionalnogo sostoyaniya oporno-dvigatelnogo apparata u sportsmenov. PhD diss. Krasnodar: KGUFKST publ., 2000. 170 p.
14. Profilaktika streptokokkovoy (gruppy A) infektsii. Clinical guidelines. Moscow: Ministerstvo zdravookhraneniya Rossiyskoy Federatsii publ., 2013. 41 p.
15. Kholyavko Yu.A. Funktsionalnoye sostoyaniye sistemy mochevydeleniya u sportsmenov vysokoy kvalifikatsii, spetsializiruyushchikhsya v greble na baydarkakh i kanoe. PhD diss. Krasnodar: KGUFKST publ., 2006. 115 p.
16. Petibois C., Cazorla G., Poortmans J-R., Deleris G. Biochemical Aspects of Overtraining in Endurance Sports. A Review. Sports Med. 2002. No. 32 (13). pp. 867-878.

The content and direction of the high-performance hockey players' technical training

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Abstract

Objective of the study was to describing a possible model of technical training for high-performance hockey players, namely, the structure, components, and principles of managing the training process.

Methods and structure of the study. To collect data on technical training of high-performance hockey players, the following methods were used: pedagogical observation, video and expert analysis of competition activities.

Results and conclusions. This study is based on video analysis of competition activities of high-performance hockey players. The focus of the analysis is put on the description of competition technical skills in terms of the complex conditions for performing the hockey competition exercise. The analysis of various aspects of competition skills in hockey is foregrounded as the key to managing the game performance. The study identified the most important components in the content and structure of technical readiness of high-performance hockey players and formulated the principles of improving hockey players' technical skills.

Keywords: *training of highly effective hockey players, pedagogical supervision, video and expert analysis*

Introduction. In hockey, the result is achieved by using sets of technical skills of the participants of the game. The skills constitute a system that is determined by the characteristics of team, group and individual tactics. Scoring a goal is one of the main tasks of hockey players on the ice. It is also important that the hockey line, which is on the ice, did not let a goal in their net. Solving these tasks requires the player to successfully perform combinations of various actions and techniques: various types of skating, stick and puck control, non-contact and contact checking (Figure 1) [1].

The volume and possible combinations of these actions are varied and determined by the characteristics of the opponent's game tactics and the conditions of the competition. Among other things, in hockey, the attack and defense actions are extremely different due to a variety of combinations of technical skills. These actions require the coordination of the interaction and coherence of the players.

Objective of the study was to describing a possible model of technical training for high-performance hockey players, namely, the structure, components, and principles of managing the training process.

Methods and structure of the study. To collect data on technical training of high-performance hockey players, the following methods were used: pedagogical observation, video and expert analysis of "competition activities" [2]. This study is based on video analysis of competition activities of high-performance hockey players. The focus of the analysis is put on the description of competition technical skills in terms of the complex conditions for performing the hockey competition exercise. The analysis of various aspects of competition skills in hockey is foregrounded as the key to managing the game performance. The study identified the most important components in the content and structure of technical readiness of high-performance hockey players and formulated the principles of improving hockey players' technical skills.

Results of the study and discussion. Experts have always been interested in the effect of hockey technical skills on the game performance and the use of specialized exercises to improve the characteristics of technical skills [3, 4, 5].

There is a consensus in the professional hockey that one of the most important skills for this sport is skating. Skating is considered as the core of the hock-

ey player's technical behavior, and an individual profile of the player's technical skills largely determines his style of play. In the professional community, there is an informal classification of hockey players: "the one who skates", "the one who thinks", "the one who skates and thinks". It might appear partially true, but undoubtedly the technical readiness of a high-performance hockey player is a much more complex property.

The skating techniques in hockey are the object of many studies [6, 7, 8] which focus on "biomechanical characteristics of skating", "the optimal range of variation in hockey technical training", "the development of advanced technical training model in hockey", "the relationship between technical skills and high performance in ice hockey", "the science and art of technical assessment and testing in ice hockey", "biomechanics of skating power", "the ways of skating faster and avoiding injury", "the relationship between ice hockey-specific complex test and aerobic capacity" [6, 7, 8]. In our view, one of the explanations for the increased interest of experts in studying different aspects of technical skills is the advances in methods for skating evaluation and thus a good measurability of skating.

The list of measured characteristics of skating is extensive: speed, power, acceleration. The listed features make skating skills a convenient tool for the coaches, managers, and scouts to consider the player's skating ability as a significant factor when selecting a player for a team. To illustrate this statement, examples are taken from the reports of professional scouts[1]: (1) "he is an offensive defenseman, who possesses an outstanding change of gear that he can display when given some open ice in the neutral zone"; (2) "he is an acute offensive impact, he moves the puck quickly, supports the play well, makes body fakes and quick cuts to force defenders to move their feet and open the space"; (3) "he gets to his top speed easily and quickly and has a knack for creating separation between himself and defenders".

Understanding the fundamentals of improving game performance for high-performance hockey players is important to coaches. Performance-based game characteristics are important for building a special physical training on and off the ice. These fundamentals embrace biomechanical, functional and technical aspects. Relying on these fundamentals has positive implications for the development of both technical skills research programs and practical methods of increasing the performance of skating. In the research of Bracko M.R. et al, National Hockey League (NHL) forwards are analyzed to investigate the time and frequency of 27 skating characteristics during a game (see table 1) [9].

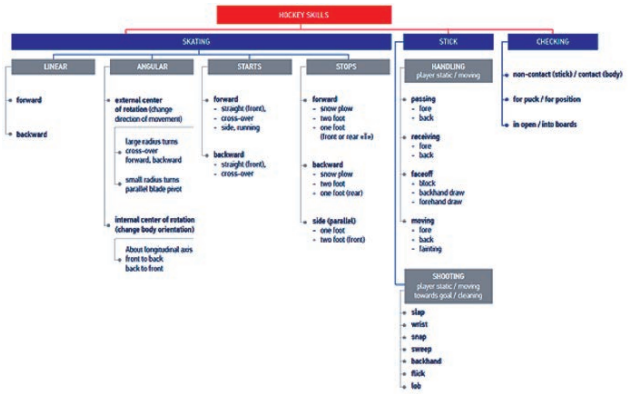

Figure 1. Structure of the hockey technique (cit. Pearsall et al 2000)

As a result of the study Bracko et al proved that (1) game-performance skating of high-performance hockey forwards is characterized by two-foot gliding, striding characteristics (low-, medium-, and high-intensity skating); (2) fast skaters have wide strides, quick recovery after push-off, deep knee flexion prior to push-off, and significant forward lean; (3) a wide stride (using hip abduction) with quick recovery is characteristic of a fast skater; (4) shoulders abduct and adduct in a smooth movement pattern coordinated with the abduction and adduction of the hips; (5) skill coaches and instructors should emulate, as much as possible, the game-performance skating [9].

The study of Bracko et al [9] offers original ideas and methodology, providing justification for the application of the most informative characteristics of the game-performance skating. However, we believe that the results obtained can be substantially supplemented, which will have a positive impact on the development of existing technical training methods of the high-performance hockey players (Figure 2).

First, it will be useful to study the characteristics of the skating skills of defenders. The concept of Bracko et al [9] which compares technical characteristics of "fast" and "slow" high-performance hockey players can be modified and extended. An advanced modification of this concept could be the creation of a scale classifying the hockey players' technical characteristics levels according to various game specializations (a left wing, a right wing, a center forward, etc.). Such a quality-and-quantity scale gives many opportunities for a coach to manage technical training [10].

Second, it is necessary to automate the methods of collecting data on technical characteristics of players' skating in real time. This task can be successfully solved by using artificial intelligence systems to recognize and evaluate movements and technical skills of high-performance hockey players. Of course, such research has begun, there are enough corresponding technologies [11,]. However, it must be recognized

1 https://www.eliteprospects.com

Table 1. Timed skating characteristics of (NHL) forwards (cit. Bracko et al 1998)

Skating characteristic	% Of total time on ice
Two-foot glide	39
Cruise slide	16,2
Medium intensity skating	10
Struggle for puck or position	9,8
Low-intensity skating	7,8
Backward skating	4,9
High-intensity skating	4,6
Two-foot stationary	3
Two-foot glide with puck	1,4
Medium-intensity skating with puck	0,8
Cruise stride with puck	0,6
Struggle with puck	0,6
Low intensity skating with puck	0,5
High intensity skating with puck	0,4
Two-foot stationary with puck	0,4

that the results of the studies are not sufficient enough yet to solve the problem. Nowadays, the hockey research is more focused on the study of high-performance hockey players' tactics. Meanwhile, the studies of technical skills have great potential and prospects because they can contribute to making dynamic models of players' technical readiness that consider many factors of internal and external conditions. To such external conditions such factors can be attributed as the sports form of the opponent team, games at home and on the road, the championship schedule, etc.

Third, the study should be extended to the long-term development of technical hockey skills. This assumes the period for young hockey players from 8 to 17 years of age. This is probably the most difficult study because it will require a long time to analyze hockey players from different realms. It will require complex mathematical calculations and computing power capable of storing and processing large amounts of data.

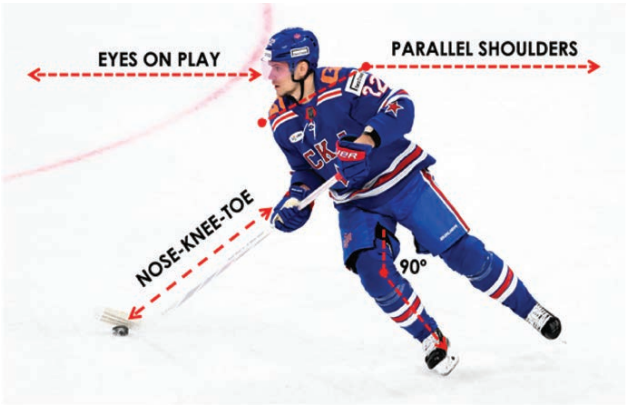

Figure 2. Biomechanical constants of high-performance hockey player technique

All items listed will allow accumulating enough information to study the relationship between skating and other technical skills, for example stick handling and checking. This approach allows to study ice hockey mechanics as a complex holistic phenomenon. Such holistic description can contribute to determining the predictors of high hockey performance. The specific subject of such research should be the study of the technical skills of a goalkeeper. On the other hand, studies that focus on the separate components of different technical skills are also important. It is also necessary to consider research works whose purpose is to describe the specifics of technical behavior not only in competitions, but also in the training process.

To scrutinize the content and direction of high-performance hockey players' technical training, we distinguish between three phases of training aimed at improving the technical skills: (1) special physical training on ice; (2) specialized technical training; (3) specialized stress skating.

The first phase includes training in the following key areas: (a) special physical training on ice with extensive methods; (b) improvement of elementary forms of coordination skills in exercise on ice; (c) proprioception and sensory control; (d) edge control in achieving stability of difficult dynamic poses. The recommended duration of this phase is 10-14 days. The duration depends on the level of players' readiness and their experience. This first phase should occupy the beginning of the preparatory period or the breaks in the competition period. Also, the first phase can be reduced to 5-7 days in the competition period. The first phase training should be organized by means of individual sessions on ice.

In the second phase the focus is on hockey specialization exercises. This part of training involves role-sharing: (a) working on hockey pattern movements; (b) accurate, effective and situational use of the hockey stick; (c) core control; (d) synchronous upper and lower body movement modes; (e) asynchronous upper and lower body movement modes. The second phase is 3 to 7 days in the preparatory period. It is also recommended to use training blocks of 1-2 days in the competition period. It is recommended to use specialized exercises in the underside or final part of practice, separately for defenders and forwards.

In the third phase the training focus is put on: (a) speed skating with puck control techniques (with obstacle or pressure); (b) enhancing puck control; (c) implementation of "standards" in different environments; (d) inclusion of situational non-standard elements in standard exercises. The exercises for the third phase are usually scheduled to 10-14 days be-

fore the competition. Such training should take place before pre-season tournaments, the first round of the championship or play-off (second round).

Our field research was based on video analysis as well as a comprehensive evaluation of the technical skills of high-performance hockey players (n=35, the players the SKA system hockey clubs). Expert evaluation methods were used at this stage. Automatic data collection was not fully implemented at this point. The software module was implemented to recognize and evaluate the skills of skating. The study was focused on developing criteria for the accurate description of skating. Successful solution of this problem allowed to move on to the recognition of individual properties of technical behavior. After solving these problems, the development of software for assessment of skating skills based on video fragments was planned. The limitation of the study is that it was conducted only during the preparatory period and during the intermission of the championship. During the study we developed principles of improvement of technical skills for high-performance hockey players which may be outlined in the following way.

(1) The regulation principle states that decisions on planning the training impact (workloads) should be based on the premise that during the high-intensity specialized training various motor qualities of players can enter into negative relationships, which can reduce the effectiveness of technical training.

(2) The synergy principle states that during high-intensity specialized training positive effects of a general nature can be observed, which can further improve individual technical components.

(3) The principle of taking into account spatial and temporal factors states that adaptation requires repetition of training effects with a given frequency, which allows to create an internal model presenting the main dynamic and static objects of the game.

C**onclusions.** Our study foregrounds the need to develop two approaches, one holistic and one non-holistic in the description of hockey technical behavior. Currently, the analytical approach is predominant, with selected technical parameters being studied. It should also be noted that hockey is in constant development, and therefore the technical side of the game is enhanced through new techniques that are to be taken into account when studying game performance.

References

1. Pearsall D. J., Turcotte R. A., Murphy S. D. Biomechanics of ice hockey. Exercise and Sport Science. 2000. pp. 675-692.
2. Platonov V. N. Osnovy podgotovki sportsmenov v olimpiiskom sporte. Nastolynaya kniga trenera. Moscow: OOO «Printleto» publ., 2021. Vol. 1. 592 p.
3. MacCormack A. G., The relationship of selected ice hockey skills to success in ice hockey. Ithaca College Theses. Paper. 167 p.
4. Beckmann H., Winkel C., Wolfgang I. S. Optimal range of variation in hockey technique training. International journal of sport psychology. (2010). No. 41 (S). pp. 5-10.
5. Shokhrukh K. Biomechanical characteristics of hockey players (2023). No. 4. pp. 67-71.
6. Schwesig R., Souhail H., Relationship between ice hockey-specific complex test and maximal strength, aerobic capacity and postural regulation in professional players. The Journal of sports medicine and physical fitness. (2017). No. 57(11). pp. 1415-1423
7. Hardegger M., et al. Sensor technology for ice hockey and skating. 2015 IEEE 12th International Conference on Wearable and Implantable Body Sensor Networks (BSN), Cambridge, MA, USA. 2015. pp. 1-6
8. Stuart A.E. The Biomechanics of Ice Hockey: Health and Performance Using Wearable Technology. Journal of Men's Health. 2022. No. 18(9). pp. 1-12.
9. Bracko M.R. et all Biomechanics powers ice hockey performance. Biomechanics. 2004. pp. 48-53.
10. Bracko M.R. The myth of power skating. Abstract presented at «Skating into the future: hockey in the new millennium II» the University of New Brunswick hockey Conference, March 22-24, 2004. Fredericton, NB.
11. Fahong L., Woodham R. J. (2009). Video analysis of hockey play in selected game situations. Image Vision Computing. No. 27(1). pp. 45-58.
12. Nelson L. J., Potrac P., Groom, R. Receiving video-based feedback in elite ice-hockey: a player's perspective. Sport, Education and Society. 19(1). pp. 19-40.
13. Miftakhov R. F., Galyautdinov M. I., Sitdikov A. M. et al. Some features of studying video analysis in sports. Uchenye zapiski universiteta imeni P.F. Lesgafta, No. 12(178). pp. 207-210.

Pressotherapy as a factor of performance improvement academic rowers

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Keywords: *pressotherapy, rowing, cardiovascular system, muscle strength, well-being, toning effect.*

Pressotherapy has a significant positive effect on the functional state of the body of academic rowers. First of all, this method affects the cardiovascular system, improving its functioning and increasing tone. In addition, pressotherapy helps to increase the strength of the back muscles, which is especially important for rowers. No less significant is the improvement of athletes' subjective well-being after pressure therapy sessions, which has a positive effect on their general condition and mood.

Relevance. Modern high-performance sports place high demands on the functional state of athletes' bodies. In this regard, an urgent task of sports science and practice is the search for effective methods of recovery and improvement of physical fitness of athletes. One of the promising directions in this field is the use of various physiotherapeutic methods, among which a special place is occupied by pressotherapy [1]. Rowing is one of the most physically demanding sports, placing high demands on the functioning of the cardiovascular and muscular systems. Rowers perform a large amount of training work, including both aerobic and anaerobic exercise, which necessitates the search for effective means of recovery and increased physical fitness.

The purpose of the study: is to study the effect of pressure therapy on the physiological parameters of academic rowers. The study involved 15 rowing athletes (15 men) aged 18 to 20 years, with sports qualifications ranging from 1st class to Master of sports. All participants underwent a series of measurements before and after the pressotherapy session. The session lasted 40 minutes and included alternating pressure on the upper and lower extremities from 50 to 60 mmHg.

Before and after pressure therapy, the following parameters were measured in athletes: resting heart rate (HR), blood pressure (BP), standing and wrist dynamometry, vital capacity (VL).

The data obtained were processed using descriptive and nonparametric statistical methods. The results are presented as the arithmetic mean and standard deviation ($M \pm \sigma$). The level of statistical significance was assumed at $p<0.05$.

The results of the study and their discussion. The results obtained indicate a pronounced tonic effect of pressotherapy on the body of rowing athletes, which is manifested in improving the functional state of the cardiovascular system, increasing the strength capabilities of the muscles of the back and upper extremities.

The improvement of peripheral blood circulation and increased oxygen delivery to working muscles, observed after sessions of pressotherapy, create favorable conditions for increasing the effectiveness of the training process and accelerating recovery after intense physical exertion [1]. In addition, increasing muscle tone and improving their trophism under the influence of pressotherapy can help reduce the risk of injury and increase the strength capabilities of athletes.

Thus, the results of the study show that the inclusion of pressotherapy sessions in the rowing training program can be an effective means of optimizing their functional state, increasing physical performance and speeding up recovery processes.

Conclusion. The results obtained indicate that pressotherapy has a pronounced tonic effect on the body of rowing athletes, mainly affecting the functioning of the cardiovascular system and the strength capabilities of the back muscles. Improved blood circulation, increased vascular and muscle tone, observed after sessions of pressotherapy, create favorable conditions for improving the effectiveness of the training process and improving athletic performance in rowing. The inclusion of pressotherapy in the complex of rehabilitation measures can be an effective tool for optimizing the physical fitness of rowers and injury prevention

References

1. Miftakhov, S.F. Combination of active and passive recovery methods in rowing / S.F. Miftakhov, T.F. Miftakhov // State, problems and ways of improving sports and wellness training in water sports: proceedings of the III All-Russian scientific and practical conference with international participation. Kazan, 2024. pp. 194-197.

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The role of physical recreation in the life of Russian combat veterans returning after a special military operation

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Keywords: *physical recreation, special military operation, individualized rehabilitation programs.*

Relevance. Physical recreation plays an important role in the lives of combat veterans, contributing to their physical and psychological recovery, as well as successful reintegration into society. Regular exercise helps veterans cope with various problems that arose as a result of participation in military operations [1].

The purpose of the study: to consider the main provisions of physical recreation that contribute to the restoration of physical fitness and psychological stability of combat veterans who have returned from a special military operation.

Results of the study and their discussion. Physical activity helps to restore physical fitness, strength, endurance, flexibility and coordination. This is especially important for veterans with injuries and disabilities, for whom adapted training programs help improve the functional capabilities of the body.

Sports help reduce the level of stress, anxiety and depression, which are common among veterans. The production of endorphins during physical activity improves mood and promotes emotional stability. Group activities also promote socialization and help veterans overcome feelings of isolation.

Regular exercise can reduce chronic pain, which is often a consequence of injuries received in combat. Physical activity helps to normalize sleep, which is especially important for veterans suffering from insomnia or other sleep disorders.

Participation in sports events and group training promotes the social integration of veterans, helps them find new friends and feel part of a community. The choice of physical activity should be based on the individual characteristics, physical condition, and preferences of the veteran. It is important to consult with a doctor and an adaptive physical education specialist.

– Adapted physical education: Specially designed programs for veterans with disabilities that take into account their limitations and capabilities.

– Cardiovascular training: walking, running, swimming, cycling - strengthen the cardiovascular system and improve overall physical fitness.

– Strength training: strengthens muscles and bones, increases endurance.

– Yoga and Pilates: improve flexibility, coordination, and promote relaxation.

– Group activities: aerobics, dancing, team sports - promote socialization and increase motivation.

– Outdoor activities: hiking, fishing, hunting - help reconnect with nature and relieve stress.

A sociological survey conducted at the Kazan Higher Tank Command School (October 2024) among cadets aged 21 to 30 years studying there and returning after a special military operation showed that 50% of respondents devote their free time to family and family recreation in nature, 30% to meeting and communicating with friends, 20% of respondents regularly engage in physical activity and use these means to restore their physical and psychological health.

Conclusion. Physical recreation can become an important tool in the process of rehabilitation and reintegration of war veterans, helping them return to a full life.

References

1. Romanov, K. P., Parfenova L. A., Salmova A. I. The application of billiard in the comprehensive rehabilitation of combat veterans. Teoriya i praktika fizicheskoy kultury. 2024. No. 11. P. 104

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The analysis of gait patterns using a color camera and computer vision

UDC 004.932.72

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Abstract

Objective of the study was to validate the approach for determining human walking metrics through the application of neural networks and computer vision techniques.

Methods and structure of the study. The scientific research involved the following steps:
1. Capturing video footage using a single RGB camera.
2. Calculating the coordinates of key points using the OpenPose neural network and creating a data set.
3. Removing any artifacts from the resulting data set using the Hodrick-Prescott filter.
4. Identifying the walking cycle.
5. Calculating the walking parameters.

The walking parameters of the subject were recorded and evaluated using the Zebris Rehawalk system (system configuration from h/p/cosmos) at the Scientific and Practical Center for Pediatric Neurology of the Moscow Department of Health. The video was captured using a Panasonic HC-VX1 camera. The Body_25 model was employed to determine the spatial positions of the subject's body parts. The parameters were calculated for the sagittal projection using the Edinburgh Scale for Visual Assessment of human walking.

Results and conclusions. According to the calculations, the following values were obtained: the duration of a walking cycle is 1,58 ± 0,92 seconds, the time taken to complete a step is 0,78 ± 0,03 seconds, the length of a step is 41,33 ± 1,92 centimeters, and the speed of walking is 1,91 ± 0,09 kilometers per hour. The movement parameters of the subject's hips, knees, and feet were calculated. When comparing the obtained values with the normative ones, slight deviations from the standard were observed in the subject's walking. The accuracy of the calculations was 0,95. The results demonstrate that computer vision can accurately assess the biomechanics of human movement and can serve as an objective monitoring tool in various fields, including sports, medical diagnostics, and rehabilitation. This approach does not require specialized training, equipment, or facilities, making it easier to monitor human movement indicators in any environment.

Keywords: *gait analysis, Edinburgh Visual Gait Scale, computer vision, OpenPose.*

Introduction. Walking is one of the most common ways of human movement in everyday life and provides vital information about its functional state and physical fitness [1, 2]. Also, by analyzing a person's gait, sports injuries can be diagnosed, as well as diseases associated with the musculoskeletal system, such as sprains, osteoarthritis, etc. [3, 4]. The active development of computer vision systems contributes to the introduction of contactless methods of human movement analysis into motor activity monitoring systems, including the use of RGB cameras, which are currently built into cell phones [5].

As shown by bibliometric analysis[1], most of the research in the field of computer vision and artificial intelligence application in assessing biomechanical parameters of human movement, including in the field of sports training, is currently being conducted in the USA, Canada and China. This is confirmed by the research results described in the source [5]. In Russia, such technologies are just beginning to develop and be implemented in the practice of monitoring human movements and, therefore, in this area they are frag-

[1] Ispolzovana biblioteka Bibliometrix yazyka programmirovaniya R. Available at: https://www.bibliometrix.org/home/.

mentary, there are no fundamental publications in this area. In order to substantiate the computer vision tools used in assessing human motor activity, including in sports training processes, we are testing an innovative method for assessing walking parameters, which is based on a combination of neural networks and deep learning. The conducted study makes it possible to integrate computer vision methods into the practice of contactless monitoring of the biomechanics of human movements, thereby increasing the objectivity of assessment in sports, rehabilitation, and medical diagnostics.

Objective of the study was to validate the approach for determining human walking metrics through the application of neural networks and computer vision techniques.

Methods and structure of the study. The assessment of walking parameters was carried out in a healthy person using the Zebris Rehawalk system (system configuration from h/p/cosmos) based on the Scientific and Practical Center for Pediatric Neurology of the Moscow Department of Health. The research methodology includes the following stages: 1) video recording on one RGB camera in the sagittal projection; 2) calculation of point coordinates using the OpenPose neural network and formation of a data array; 3) cleaning the resulting array from artifacts using the Hodrick-Prescott filter, which allows removing the cyclic component from the time series; 4) identification of the walking cycle; 5) calculation of walking parameters. To calculate the coordinates of the location of the test subject's body elements in two-dimensional space, the Body_25 model was used (Figure 1). Video recording was carried out on a Panasonic HC-VX1 video camera with the following parameters: 4K recording format at a speed of 50 frames per second, with a maximum bitrate of 500 Mbps. The MPEG-4 AVC/H.264 compression algorithm was used during recording in HD resolutions (1920 × 1080).The distances between points were calculated using the formula:

$$d_{ij} = \sqrt{(x_i - x_j)2 + (y_i - y_j)^2}$$

where x_i, x_j, y_i y_j – coordinates of the analyzed points in two-dimensional space.

The angular distances were determined using the cosine theorem. The parameters were calculated for the sagittal projection using the Edinburgh Visual Gait Scale (EVGS), which includes an analysis of the spatial positions of the main body elements involved in movement in all phases of its cycle [6]. The EVGS method includes the calculation of 34 walking parameters in the sagittal and frontal projections.

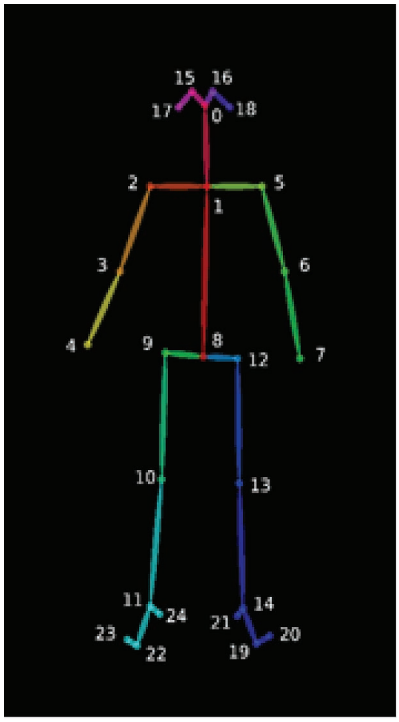

Figure 1. Location of points in the Body_25 model

In the study, after identifying the walking cycles, the calculation of the main indicators was performed, such as the walking cycle time, step execution time, step length, walking speed. The values of the angles of movement of the hips, knees, feet during the walking of the subject were also calculated using the EVGS method for the sagittal projection. A comparison of the obtained values with the normative ones, which are given in the method used in the study, was performed. The accuracy of the calculations was 0,95.

Results of the study and discussion. The complete human gait cycle consists of two main phases – the support phase and the swing phase, including stance and turn. The gait cycle is calculated for one leg [6]. The events of the subject's foot strike and toe-off were determined using the method given in the source [7]. Figure 2 shows the identification of the gait cycle events on the timeline 1-128 frames. Points 19 and 22 of the Body_25 model (determine the toes) were used in the calculation. The gait cycle time is 1,58±0,92 s, the step execution time is 0,78±0,03 s, the step length is 41,33±1,92 cm, the walking speed is 1,91±0,09– km/h. The subject completes about 76 gait cycles per minute.

Walking indicators, calculation methods, estimated and standard values

Indicator	Designation (Figure 3)	Calculation method	The value obtained using the author's algorithm	Norm values
Maximum hip flexion during walking, degrees	1	The angle formed by points 1, 8, 13 (10).	160,60 *19,40**	25,00-45,00
Maximum knee extension during walking, degrees	2	The angle formed by points 12 (9), 13 (10), 14 (11).	176,94 *3,06**	5,00-15,00
Angle of foot rise from horizontal plane, degrees	3	The angle formed by points 21 (11), 19 (22) and the horizontal plane of the floor (treadmill).	19,04	No, according to literary data no more than 20
Maximum deviation of the torso from the vertical axis (in the middle pose), degrees	4	It is defined as the angle between points 1, 8 and the vertical line drawn from point 8, determined in the middle pose.	3,99	0-5
Maximum hip extension in mid-stance, degrees	1	The angle formed by points 1, 8, 13 (10). Determined in the middle pose.	188,48* 8,48	0-20
Maximum knee extension in mid-stance, degrees	2	The angle formed by points 12 (9), 13 (10), 14 (11). Determined in the middle pose.	180,8 0,8	0-15
Maximum angle of ankle flexion in the middle position, degrees	5	The angle formed by points 13 (10), 14 (11), 19 (22). Determined in the middle pose.	86,88 3,12**	No more than 5
Maximum angle of ankle flexion during walking, degrees	5	The angle formed by points 13 (10), 14 (11), 19 (22). Determined while walking.	82,77	Not specified

* – Defined as the difference between 180 and the obtained angle value. Used to convert the values of the indicators to the Edinburgh scale standards. ** – Defined as the difference between 90 and the obtained angle value. Used to convert the values of the indicators to the Edinburgh scale standards.

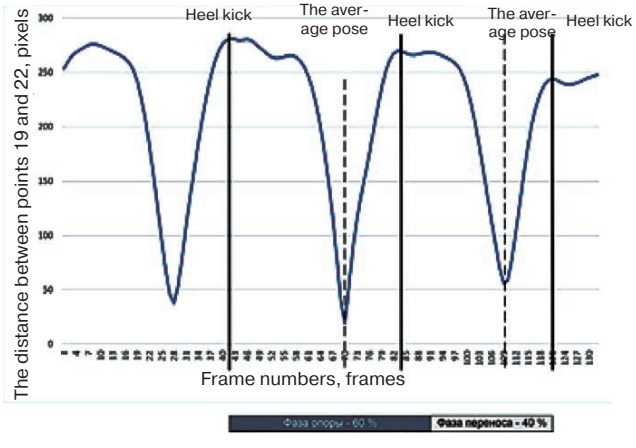

Figure 2. Identification of human gait cycle events

Figure 3 shows the calculated values of angles according to EVGS. The table shows the values of the calculated indicators, a brief description of the calculation method, and the standard values according to the EVGS method. Indicators whose values deviate from the standard values are highlighted in italics (see table). Based on the calculations performed, the following conclusions can be made. The subject's walking indicators differ slightly from the standard values (maximum hip flexion during walking, degrees; maximum knee extension during walking) (see table), which may require additional research.

Conclusions. The study tested the method for calculating human walking parameters using neural networks and parametric geometry. The results showed that computer vision has sufficient accuracy in assessing the biomechanics of human movement, in the study this indicator was 0.95, and can be used as a tool for objective monitoring in various sports, medical diagnostics, and rehabilitation. The use of

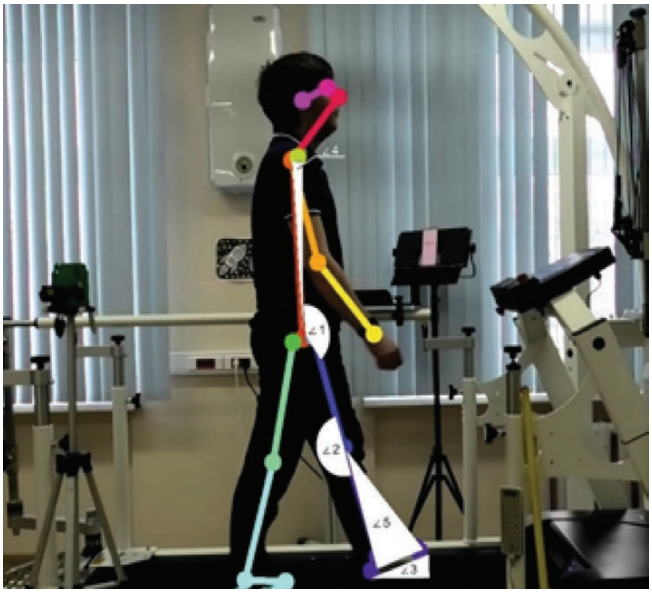

Figure 3. Estimated angles according to the Edinburgh Visual Gait Scale

this approach does not require special training, equipment, or premises, which facilitates monitoring human movement parameters in any conditions.

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References

1. Wang H. et al. Markerless gait analysis through a single camera and computer vision. Journal of Bio mechanics. 2024. Vol. 165. pp. 112027. https://doi.org/10.1016/j.jbiomech.2024.112027.
2. Hatamzadeh M.A et al. kinematic-geometric model based on ankles' depth trajectory in frontal plane for gait analysis using a single RGB-D camera eh. Journal of Biomechanics. 2022. Vol. 145. pp. 111358. https://doi.org/10.1016/j.jbiomech.2022.111358.
3. Leardini Al. et al. Kinematic models of lower limb joints for musculo-skeletal modelling and optimization in gait analysis. Journal of Biomechanics. 2017. Vol. 62. pp. 77-86. https://doi.org/10.1016/j.jbiomech.2017.04.029.
4. Klopfer-Kramer et al. Is. Gait analysis – Available platforms for outcome assessment. Injury. 2020. Vol. 51. Supplement 2. pp. S90-S96. https://doi.org/10.1016/j.injury.2019.11.011.
5. Kumar M. et al. Gait recognition based on vision systems: A systematic survey. Journal of Visual Communication and Image Representation. 2021. Vol. 75. pp. 103052. https://doi.org/10.1016/j.jvcir.2021.103052.
6. Ramesh S.H. et al. Automated Implementation of the Edinburgh Visual Gait Score (EVGS) Using OpenPose and Handheld Smartphone Video. Sensors. 2023. Vol. 23. pp. 4839. https://doi.org/10.3390/s23104839.
7. Zeni Jr. J. A. Two simple methods for determining gait events during treadmill and overground walking using kinematic data. Gait & posture. 2008. Vol. 27. No 4. pp. 710-714.

Transfer control standards for special training of hockey players undergoing sports training

UDC 796.966

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Abstract

Objective of the study was to establish guidelines for the development and implementation of training protocols for elite hockey players.

Methods and structure of the study. The findings from the assessment of 135 hockey players, representing a diverse range of abilities and positions, spanning various age groups (from 9 to 19 years old), were utilized for the purpose of this study. The assessment focused on evaluating the following motor skills of the players: the speed at which they acquire the puck, their agility, and their ability to throw the puck with precision.

Results and conclusions. Based on pre-established regression models that enable the extrapolation of the data obtained, and considering the duration of the phases of sports training and the age of individuals for enrollment in these phases in the sport of hockey, control and transfer standards for years and phases of training are proposed: the initial training phase (8 years), the training phase (11 years), the improvement phase of sports skills (15 years), and the phase of advanced sports skills (17 years). The proposed transfer standards are recommended for use in the educational and training process as part of the gradual monitoring of the fitness of hockey players. The article provides a comprehensive explanation of the proposed tests and the method for calculating the necessary indicators.

Keywords: *examination, special tests, sports result, sports preparedness, hockey, testing, stage control, standards.*

Introduction. Previously conducted studies allowed us to select the most informative indicators among many indicators assessing the special motor readiness of hockey players and which change significantly with the age and qualification of hockey players [1-4]. Special motor abilities in hockey should include three types of speed: speed of puck control (the ability to control the puck in minimal time for further controlled control of the puck), maneuvering speed (the ability to quickly move on the ice, including with the puck and changing the direction of movement), throwing speed combined with accuracy (the ability to hit the target zone in minimal time) [1, 4]. These abilities of hockey players can be assessed using tests such as: 16 m skating; 16 m straight puck dribbling; puck dribbling with dribbling (to the right and left sides); receiving the puck until complete control; throwing into the target zone (convenient and inconvenient side). In these tests, it is recommended to consider the following indicators for assessing age dynamics: duration of puck reception until complete mastery (average value for 10 attempts), coefficient of variation of duration of puck reception until complete mastery (over 10 attempts), duration of 16 m run on skates (average value for 3 attempts), duration of 16 m straight puck dribbling (average value for 3 attempts), duration of puck dribbling with dribbling over a 16 m section (average value for 3 attempts), speed of probability of throwing a puck (over 10 throws into the target zone).

Objective of the study was to establish guidelines for the development and implementation of training protocols for elite hockey players.

Methods and structure of the study. The study used the test results of 135 hockey players of various qualifications and positions in a wide age range (from 9 to 19 years). Based on the pre-developed regres-

sion models (statistical significance of the regression equations $p \leq 0.05$), allowing extrapolation of the obtained data [4], and taking into account the duration of the stages of sports training and the age of individuals for enrollment in the stages of sports training in the sport of hockey, control and transfer standards were calculated by years and stages of training: initial training stage (8 years), training stage (11 years), stage of improving sports skills (15 years), stage of higher sports skills (17 years). The standards are defined for the indicators of such tests as: 16 m skating; 16 m straight puck dribbling; puck dribbling with dribbling (to the right and left sides); puck reception until complete mastery; throw into the target zone (convenient and inconvenient side).

Results of the study and discussion. To assess the special training of hockey players, it is recommended to follow the following testing procedure.

Receiving the puck until you have full control. The sender and the receiver (tested) player are located at the face-off points (distance 14 m). The start of the reception duration is the moment the puck leaves the sender's stick. The end of the reception duration is the moment the puck comes to a complete stop while simultaneously maintaining contact with the receiver's stick. Video recording is performed using a camera with a shooting frequency of at least 50 frames per second. Based on the results of video analysis (timing) in 10 attempts, such informative indicators as the average value and the variation coefficient of the puck reception duration are calculated. To increase the reliability of the test, different "transmitters" should not be involved; if possible, the passes should be performed by the same person (with the necessary rest intervals between the subjects). The number of attempts (passes) is 10. The angle (sector) of the puck's flight dispersion is 15°. The task for the athlete is to gain control of the puck as quickly as possible, performing the technique as follows: the puck must be completely stopped (motionless), while the blade of the stick must be in contact with the stopped puck.

16m skating. The test subject's task is to skate on ice as fast as possible, starting from a designated start line (free start). The time count begins when the player crosses the start line and ends when he crosses the finish line. To improve the accuracy of measuring the duration of the skate run, it is recommended to use optoelectronic pairs located at the edges of the recorded segment. An alternative option is video recording with a frequency of at least 100 frames per second. To improve the reliability of the test, after a trial attempt, the athlete must be given 3 attempts to complete the test (taking into account the rest intervals between attempts), and the result in the test will be determined as the average value for three attempts.

Dribbling the puck straight 16 m. The requirements for completing the task are similar to the previous one. The specifics of dribbling the puck suggest the following: the puck, when dribbling, should not move more than 2–2.5 m away from the hockey player (the distance of an outstretched arm with a stick).

Dribbling the puck while performing a dribble over a 16 m area. The requirements for completing the task are also similar to the previous one. When completing the task, the athlete must go around all the obstacles without moving them.

Throw test. The athlete makes 10 throws of pucks located along the line passing through the final face-off points. Throws are made into the target zone – 1/9 of the goal area in the right or left corner. Each of the 10 pucks suddenly appears from under an opaque screen (1,5 × 1,5 m^2, which does not allow you to see the arrangement of the pucks), which gradually reveals (moving from the center) one puck at a time. Using video analysis equipment (with a shooting frequency of at least 50 frames per second), such indicators as the probability of scoring (the percentage of the number of pucks scored to the total number of throws) and the average duration of a throw in a series (the average duration of all throws made in a series) are determined. The calculated indicator is the rate of probability of scoring (the ratio of the probability of scoring to the average duration of a throw). Based on the developed regression models [4] and taking into account the duration of the stages of sports training and the age of individuals for enrollment in the stages of sports training in the sport of hockey, control and transfer standards are proposed for years and stages of training in the sport of hockey in accordance with the requirements for the results of the implementation of the sports training program in the sport of hockey at each stage of sports training, the fulfillment of which provides grounds for transferring an individual undergoing sports training to the next stage of sports training based on the results of special tests conducted on the ice (see table).

Conclusions. The proposed control and translation standards are recommended to be used in the educational and training process as part of the stage-by-stage control of the readiness of hockey players.

Control and transfer standards by years and stages of training in the sport of hockey, the fulfillment of which provides grounds for transferring a person undergoing sports training to the next stage of sports training (based on the results of special training tests)

An indicator of an athlete's motor ability	Stage of sports training (age)			
	Basic training (8 years)	Training (11 years)	Improving sports skills (15 years)	Highest sportsmanship (17 years)
Duration of receiving the puck until full control (average value), s (no more)	2,1	1,9	1,7	1,5
Variation coefficient of the duration of receiving the puck until full control, % (no more than)	95	85	72	65
Duration of 16 m run on skates, s (no more)	3,17	3,08	2,96	2,90
Duration of puck movement straight 16 m, s (no more)	3,27	3,19	3,07	3,01
Duration of puck dribbling with dribbling on a 16 m section, s (no more)	3,84	3,70	3,51	3,41
Puck scoring rate (shots into the target zone), %/sec (not less than)	17	23	31	35

References

1. Medvedev V.G., Medvedeva E.M., Davydov A.P., Napalkov K.S. Informativnyye pokazateli dvigatelnoy podgotovlennosti yunykh khokkeistov. Teoriya i praktika fizicheskoy kultury. 2023. No. 1. pp. 8-10.
2. Medvedev V.G. Skorost veroyatnosti zabrasyvaniya shayby kak pokazatel spetsialnoy podgotovlennosti khokkeistov pri vypolnenii broskov. Sport – doroga k miru mezhdu narodami. Proceedings of the VI International scientific-practical conference, October 26-28, 2022. Moscow: RUS «GTSOLIFK», 2022. pp. 140-143.
3. Medvedev V.G., Medvedeva E.M., Davydov A.P. Regressionnaya model spetsialnoy dvigatelnoy podgotovlennosti khokkeistov razlichnykh vozrastnykh grupp. Teoriya i praktika fizicheskoy kultury. 2024. No. 1. pp. 14-16.
4. Medvedev V.G., Medvedeva E.M., Davydov A.P., Shalmanov A.A. Regressionnaya model obshchey dvigatelnoy podgotovlennosti khokkeistov razlichnykh polovozrastnykh grupp. Teoriya i praktika fizicheskoy kultury. 2023. No. 2. pp. 18- 20.

The process of calculating the proportion of unproductive mental and physical movements and actions in a judoka's execution of techniques

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Abstract

Objective of the study was to detect the presence of an algorithm in the chain of cause-and-effect relationships that govern the probabilistic consolidation of ineffective intellectual and physical actions and movements of a young judoka during training and competition, enabling teachers to prevent the negative trend of memorization and the emergence of automatic errors in performance.

Methods and structure of the study. The study employed video analysis, cluster analysis, and descriptive statistics to examine the structural elements of movement. The research focused on a group of coaches from the Sambo – 70 Sports and Education Center, who evaluated the preconditions and causes of technical mistakes made by a young judoka in two competitive scenarios.

Results and conclusions. In the fundamental groups, it is not the preconditions that are determined, but the semantic structures of the direct activity format that mirror the substance of the appropriate practical advice from the instructor. The creation of a positive competitive experience for a young judoka should be grounded in the examination of semantic units within the algorithm of the ratio of ineffective intellectual and motor operations and actions to prevent the process of its transformation into an algorithm for their consolidation.

By dissecting the causes of mistakes through semantic analysis, we can discern the path for pedagogical influence to update the content of training and competitive activities.

Keywords: *judoka, confrontation with an opponent, ineffective intellectual-motor operations and actions, probabilistic consolidation, correlation algorithm, automated errors, warning.*

Introduction. Improving the structural components of training and competitive activities is associated with increasing the parameters of its efficiency and effectiveness in the segments of a motor operation, action and complex of actions that must be situationally adequate [7]. Considering the scientific issue of the emergence and consolidation of motor errors in the stereotypes of motor behavior of a young athlete, V.N. Platonov identifies 5 groups of reasons: “motor insufficiency – coordination, physical qualities, skill poverty; learning defect; psychogenic – poor self-control, psychological external influence, uncertainty, apprehension, fear..; unusual conditions – characteristics of the opponent, regulation of activity..; random) [8], which, in our opinion, are hierarchically linked and predetermined by the developing regulations of training and competitive confrontation with the opponent. At the level of motor operation, the reasons identified by V.N. Platonov are primary and isolated. At the level of the integral action and the specifics of its integration into a motor combination, a cause-and-effect relationship can be built between the large-scale influence of the “error – a prerequisite for a failure in efficiency” on the occurrence of the “error – an inef-

fective condition for implementing an action, accumulating in the "error of ineffective completion of an action, combination" taking into account the variability of the development of the situation. In the context under consideration, we are interested in, according to M.M. Bogen, the phase in the structure of the integral action – "definition of the content of a motor action as a way (method) of solving a motor problem, the characteristics of its operational composition with the number of operations included in the motor action" [3, 57 p.], which is predetermined, according to P.K. Anokhin – by situational afferentation, its perception at the intersection with memory as previous motor experience, motivation and the subsequent transition of this systemic formation to the decision-making stage [1, pp. 17-59]. Where is the process of movement control, according to N.A. Bernstein, is considered as "an active, purposeful system... based on sensory corrections, which present the principle of hierarchical, level control of movement" [2, pp. 373-392]. The resource for optimizing motor skills and abilities, according to N.D. Gordeeva, is "the peculiarities of the organization of serial sensorimotor actions" [4, 64 p.], where "the condition for generating a perfect action" is "productive chaos" [5, 116 p.] as the essential basis of productive search activity in self-determination of more rational parameters of movement and "reflection of the process of constructing an objective action" [6, 90 p.].

Objective of the study was to detect the presence of an algorithm in the chain of cause-and-effect relationships that govern the probabilistic consolidation of ineffective intellectual and physical actions and movements of a young judoka during training and competition, enabling teachers to prevent the negative trend of memorization and the emergence of automatic errors in performance.

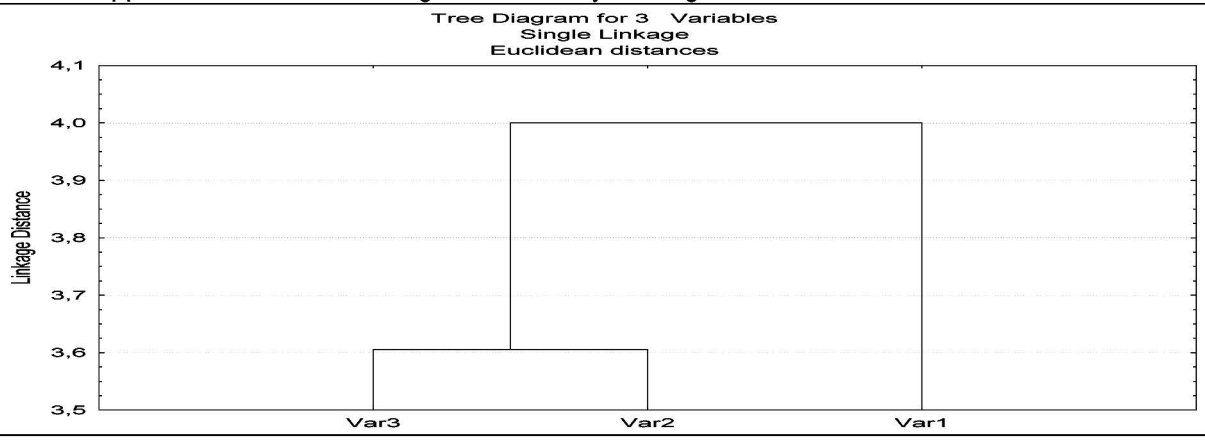
Methods and structure of the study. The following methods were used: video analysis of structural components of movement in the training and competitive activity of a young judoka; cluster analysis; methods of descriptive statistics. The study was conducted on a contingent of coaches (n=10) of the Sports and Education Center "Sambo-70", assessing the prerequisites and causes of technical errors in a young judoka in two intellectual-motor competitive situations, characterizing the presence of an emerging algorithm of ineffective intellectual-motor operations.

Results of the study and discussion. A reflexive self-analysis of the reasons for making an error, conducted on a contingent of young judokas, made it possible to identify semantic units: "got scared (played it safe) – was late with the moment of starting the action – chose the most predictable (readable) action by the opponent – did not have enough time to implement the maximum explosive effort – lost dynamic balance and lost the position of superiority over the opponent". The figure shows the average values of the trainers' opinions on the hierarchy of reasons for the manifestation of errors. The young judoka (I.M.) states: "it went wrong", but the algorithm of the movement can no longer be "broken", since the influence of inertial forces, the vector of the opponent's effort during the confrontation and other factors is significant. We have identified a special co-organization of cause-and-effect relationships for making errors in the execution of movements of the first and second technical techniques and the filling of the basic clusters: despite the high significance rating (1,2) of factor 1.B. "did not take into account the low location of the opponent's center of mass", the basic cluster included characteristics of immediate activity-based bases (1.A. and 1.B.); similarly, despite the basic reason 2.B. "Was afraid of the opponent's psychological pressure (played it safe in his actions)" with a high significance rating, the lower basic cluster included 2.G. "was late with the start of the action" and 2.D. "chose the action most easily read by the opponent" – immediate characteristics of a segment of competitive confrontation.

Thus, the basic semantic constructs determine the content of the coach's practical recommendations: instead of the expected rating instruction "take into account the location of the center of mass", it is advisable according to the basic cluster to "master the technique in a low stance" and "take the opponent out of the balance zone"; instead of the instruction "do not be afraid", it is relevant to "perform the technical technique in a timely manner". It is obvious that cluster analysis does not have the function of semantic analysis, semantic interpretation of constructs, but mathematically turns us to an activity-based approach that ensures the correction of the ineffective intellectual and motor behavior of the athlete.

Conclusions. Prevention of the process of consolidation of motor errors in the motor memory of a young athlete is associated with the actualization of search intellectual-motor behavior when understanding the causes of the cumulative effect of technical errors in the implementation of motor operations and

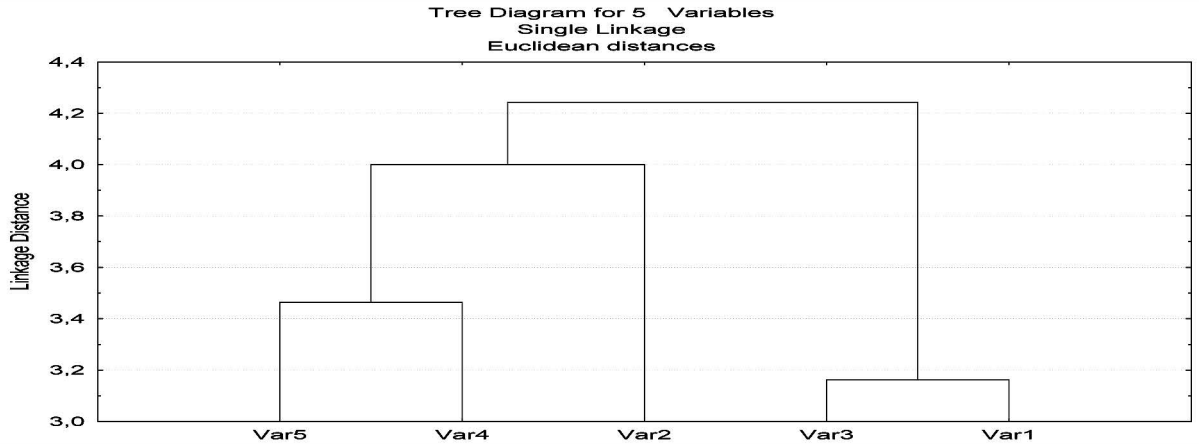
1. Judoist's technique: throw over the hip tangentially Uki-goshi.
2. Opponent's counter: throwing off balance by twisting Uki-otoshi.



Semantic constructs of ineffective intellectual and motor actions of coaches and athletes, characterizing a segment of competitive confrontation with an opponent

A. Did not take the opponent out of his balance zone (2.9). Poor self-control.	**B.** The technique has not been mastered in a low execution position (1.9). Lack of skill.	**C.** Did not take into account the low location of the opponent's center of mass (1,2). Features of the opponent.

3. Judoist's technique: throw across the chest Ura-nage. Opponent's counter: undercut from the inside Kouchi-gari.



2.A. There was not enough time to realize maximum explosive effort (4.1). Insufficient physical qualities.	**2.B**. Feared the psychological pressure of the opponent (played safe in his actions) (1.1). *Psychological external influence; uncertainty, fear.*	**2.C.** Lost dynamic balance, lost the position of superiority over the opponent (4.9). *Coordination deficiency.*	**2.G.** Delayed with the moment of commencement of action (2.1). *Unusual conditions of regulation of activity.*	**2.D.** Chose the most predictable (readable) action by the opponent (2.9). *Skill poverty.*

Pedagogical characteristics of the algorithm of the relationship between ineffective intellectual-motor operations and actions of a judoist (I.M.). Note: in italics – formulations according to V.N. Platonov.

actions, which requires an analysis of the structural units of cause-and-effect relationships in the identified algorithm. To form a positive competitive experience of a young judoka, it is extremely important that the algorithm of the relationship between ineffective intellectual-motor operations and the actions of a

judoka is not transformed into an algorithm for their consolidation.

Analysis of the causes of the development of ineffective intellectual-motor operations and actions requires specification of the problem area: insufficient level of formation of physical qualities or their presence against the background of the inability to implement in the conditions and regulations of competitive confrontation.

Reliance on the classification grounds for the occurrence of motor errors according to V.N. Platonov is important in their systematization for various sports, but when detailing the causes of errors in a specific sport, the semantic analysis of semantic constructs that reveal the direction of pedagogical influence on the construction of the content of training and competitive activities acquires particular significance.

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References

1. Anokhin P.K. Ocherki po fiziologii funktsionalnykh sistem. Moscow: Meditsina publ., 1975. pp. 17-59.
2. Bernshteyn N.A. Fiziologiya dvizheniy i aktivnost. Moscow: Nauka publ., 1990. pp. 373-392.
3. Bogen M.M. Obucheniye dvigatelnym deystviyam. Moscow: Fizkultura i sport publ., 1985. 192 p.
4. Gordeeva N.D., Evsevicheva I.V., Korneev A.A. Osobennosti organizatsii seriynykh sensomotornykh deystviy. Vestnik Moskovskogo universiteta. Seriya 14: Psikhologiya. 2007. No. 4. pp. 64-74.
5. Gordeeva N.D. Produktivnyy khaos kak usloviye porozhdeniya sovershennogo deystviya. Voprosy psikhologii. 2007. No. 3. pp. 116-126.
6. Gordeeva N.D., Zinchenko V.P. Rol refleksii v postroyenii predmetnogo deystviya. Refleksivnyye protsessy i upravleniye. 2002. Vol. 2. No. 2. 90 p.
7. Kuzmenko G.A. Kontseptsiya intellektualnogo razvitiya podrostkov v detsko-yunosheskom sporte. Moscow: MPGU publ., 2017. 212 p.
8. Platonov V.N. Podgotovka kvalifitsirovannykh sportsmenov. Moscow: Fizkultura i sport publ., 1986. 288 p.

The pacing and tempo of running in the analysis of the performances of the top hurdlers at the olympic games in paris

UDC 796

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Abstract

Objective of the study was to pinpoint the crucial kinematic metrics that contribute to the success of the world's top male hurdlers in the 110-meter hurdles, we conducted a thorough examination of their performances at the Olympic Games in Paris.

Methods and structure of the study. The examination of official documents, the study of video recordings of elite hurdlers in competition, and the application of statistical techniques are conducted.

Research results and conclusions. It has been discovered that in modern men's short-distance hurdling, the runners maintain a rapid pace between obstacles, often exceeding the speed of highly skilled sprinters. The limited space between hurdles and the high hurdles force athletes to rely on speed, rather than distance, to achieve success. The running technique of the Olympic champion G. Holloway (USA) is characterized by the efficient execution of motor actions, particularly in terms of technical aspects at the hurdle distance. As the distance and competitive result increase, the athlete's pace of steps accelerates, and the speed of the hurdle step also increases. In these circumstances, the hurdle step appears to be a running step executed with a greater amplitude and a higher trajectory compared to a regular running step, while the entire distance appears to be covered in a single motion.

Keywords: *hurdles, biomechanical analysis, competitive activity, rhythm-tempo structure.*

Introduction. In the 110 m hurdles, the determining factors for success are the hurdlers' ability to quickly overcome obstacles, maintain a high pace of running movements between hurdles, and the ability to maintain a stable rhythm of movements at all sections of the distance without slowing down due to fatigue [1-3]. In men's 110 m hurdles, the clear favorite in recent years has been the long-term leader of the world ranking, American G. Holloway (12,86 s at the 2024 US Olympic selection). The best places in the final were claimed by the winners of the US Olympic selection F. Kritenden (12,93 s), D. Robertson (12,96 s), and the European champion, Italian L. Simonelli (13,05 s). High results before the Olympic Games were also shown by O. Bennett from Jamaica (13,09 s), Japanese R. Muratake (13,07 s) and S. Izumya (13,10 s), Spaniard E. Lyopis (13,10 s), and Jamaican champion R. Broadbell (13,09 s).

Objective of the study was to pinpoint the crucial kinematic metrics that contribute to the success of the world's top male hurdlers in the 110-meter hurdles, we conducted a thorough examination of their performances at the Olympic Games in Paris.

Methods and structure of the study. An analysis of documentary materials was carried out 1,2, video analysis of the competitive activity of the world's leading hurdlers using the Dartfish software, methods of mathematical statistics.

Results of the study and discussion. In the course of the video analysis of the competitive activity of hurdlers in the semi-final and final races of the 2024 Olympic competitions in the 110 m hurdles, we identified the main factors influencing the efficiency of the hurdlers' actions, as well as the degree of their

[1] Available at: https://en.wikipedia.org/wiki/Athletics_at_the_2024_Summer_Olympics.
2_Available at: https://worldathletics.org/.

Table 1. Average inter-hurdle step tempo and hurdle step time of athletes participating in the 2024 Paris Olympic Games in the semi-final and final races

№	Athlete	Country	Stage	Temp	$T_{Bar.step}$	BRS	SR	SR-BSR
				S/s	A	A	A	A
1	G. Holloway	USA	Final	5,28+0,24	0,43+0,03	12,86	12,99	0,13
			s/final	5,35+0,26	0,44+0,02	12,86	12,98	0,12
2	D. Roberts	USA	Final	5,16+0,14	0,45+0,1	12,96	13,09	0,13
			s/final	5,33+0,40	0,47+0,1	12,96	13,10	0,14
3	R. Broadbell	Jamaica	Final	5,25+0,15	0,45+0,1	13,09	13,09	0,00
			s/final	5,09+0,35	0,45+0,1	13,09	13,21	0,12
4	E. Lyopis	Spain	Final	4,92+0,16	0,42+0,02	13,09	13,20	0,11
			s/final	5,02+0,42	0,44+0,01	13,09	13,17	0,08
5	R. Muratake	Japan	Final	5,52+0,15	0,48+0,01	13,07	13,21	0,14
			s/final	5,37+0,41	0,49+0,02	13,07	13,26	0,19
6	F. Critenden	USA	Final	5,43+0,08	0,48+0,02	12,93	13,32	0,39
			s/final	5,15+0,22	0,46+0,01	12,93	13,23	0,30
7	O. Bennett	Jamaica	Final	5,22+0,15	0,46+0,01	13,09	13,34	0,25
			s/final	5,29+0,32	0,46+0,02	13,09	13,09	0,00
8	H. Parchment	Jamaica	Final	5,26+0,16	0,46+0,02	13,18	13,39	0,21
			s/final	5,14+0,41	0,45+0,01	13,18	13,19	0,01

Note: BRS – best result of the season; CR – competition result; Tbar.step – time of the hurdle step.

influence on the final competitive result. For this purpose, the following were determined: the frequency of steps on each inter-hurdle segment and the time of performing a hurdle step on each obstacle. The time of performing a hurdle step (the time interval from the moment the foot is placed on the support during the push-off to the moment it touches the track during the landing after the hurdle) is largely determined by the time it takes to overcome the obstacle. At the same time, it is interpreted as a running step performed over the obstacle, which corresponds to the target tasks of hurdle running: "to overcome obstacles with a running step, not a jump" [2]. In the table. 1 shows the average hurdle step tempo and hurdle step execution time of the participants in the semi-finals and finals of the Paris Olympic Games in the 110 m hurdles.

Video analysis of competitive activity of hurdlers showed that changing the rhythm of steps in hurdling

Table 2. Statistical relationship indicators for the tempo of inter-hurdle steps, time of hurdle step and time to overcome inter-hurdle blocks among the finalists of the 2024 Olympic Games.

№	Athlete	Country	Stage	Correlation relationship indicators		
				$Temp/T_{bar.step}$	$T_{Bar.step}/T_{block}$	$T_{block}/Temp$
1	G. Holloway	USA	Final	**-0,635**	**0,888**	**-0,917**
			s/final	**-0,613**	**0,859**	**-0,919**
2	D. Roberts	USA	Final	-0,306	**0,761**	**-0,827**
			s/final	0,306	0,370	**-0,761**
3	R. Broadbell	Jamaica	Final	-0,005	**0,621**	**-0,779**
			s/final	0,015	**0,743**	**-0,633**
4	E. Lyopis	Spain	Final	0,410	**0,648**	-0,420
			s/final	-0,318	**0,628**	**-0,930**
5	R. Muratake	Japan	Final	-0,522	**0,872**	**-0,854**
			s/final	0,507	0,418	-0,564
6	F. Critenden	USA	Final	-0,328	**0,913**	**-0,648**
			s/final	-0,064	**0,667**	**-0,763**
7	O. Bennett	Jamaica	Final	-0,476	**0,771**	**-0,910**
			s/final	-0,230	**0,813**	**-0,731**
8	H. Parchment	Jamaica	Final	-0,351	**0,697**	**-0,901**
			s/final	-0,265	**0,617**	**-0,912**

Note: Tbar.step – time to complete a barrier step; Tblock – time to overcome a barrier block.

Table 3. Time on individual sections of the distance for athletes participating in the 2024 Olympic Games in the semi-final and final races in the 110 m hurdles

№	Athlete	Country	Stage	1st barrier	2-5 bar. block	6-10 bar. block	Difference	Finish	CR
				A	A	A	A	A	A
1	G. Holloway	USA	Final	2,46	3,89	4,16	0,27	1,47	12,99
			s/final	2,50	3,89	4,17	0,28	1,45	12,98
2	D. Roberts	USA	Final	2,49	4,08	4,11	0,03	1,36	13,09
			s/final	2,51	4,02	4,12	0,10	1,40	13,10
3	R. Broadbell	Jamaica	Final	2,59	4,04	4,08	0,04	1,34	13,09
			s/final	2,60	4,10	4,10	0,00	1,38	13,21
4	E. Lyopis	Spain	Final	2,58	4,04	4,15	0,11	1,38	13,20
			s/final	2,58	4,02	4,12	0,10	1,40	13,17
5	R. Muratake	Japan	Final	2,61	4,05	4,14	0,11	1,36	13,21
			s/final	2,61	4,10	4,15	0,05	1,36	13,26
6	F. Critenden	USA	Final	2,62	4,10	4,16	0,06	1,38	13,32
			s/final	2,60	4,09	4,13	0,04	1,37	13,23
7	O. Bennett	Jamaica	Final	2,57	4,08	4,19	0,07	1,45	13,34
			s/final	2,53	3,98	4,14	0,16	1,39	13,09
8	H. Parchment	Jamaica	Final	2,63	4,10	4,16	0,06	1,44	13,39
			s/final	2,60	4,00	4,12	0,12	1,43	13,19

significantly affects the final sports result. It would be logical to assume that as the speed of overcoming the hurdle blocks increases, the time of performing steps between the hurdles should decrease in parallel (i.e., the step tempo should increase) and, in parallel with this, the time of overcoming the obstacle should decrease (i.e., the hurdle step time should decrease). This should be expressed in the form of a direct statistical relationship between all three characteristics. But in practice, this is not achieved by all athletes, but only by the Olympic winner G. Holloway (USA), whose indicators show the indicated reliable relationships (Table 2). High statistical relationship between the time of overcoming the inter-hurdle block with the tempo of inter-hurdle steps ($r = -0,919–0,917$, $p < 0,001$) and the time of performing the hurdle step ($r = 0,859–0,888$, $p < 0,01$) in both races. An obvious statistical relationship was also found between the step tempo and the hurdle step time ($r=-0,613–-0,635$, $p<0,05$). That is, with the increase in the distance speed, the athlete's step tempo increases and the speed of the hurdle step execution increases. Under these conditions, the hurdle step is perceived as one of the running steps, executed with a greater amplitude and along a higher trajectory, and visually the entire run is perceived as a single step.

The Olympic champion's running is appropriate and logical in terms of solving technical problems from start to finish. Other athletes lack such integrity and stability of technique. The only downside to G. Holloway's running is a slight drop in speed in the second half of the distance. The athlete covered the first four inter-hurdle blocks in the semi-finals and finals in 3,89 sec, the last four blocks in 4,16 sec and 4,17 sec, respectively, i.e. the time loss was 0,27-0,28 sec. This is undoubtedly the reserve of an athlete who is already potentially ready to set a new world record at this distance. In general, the running of most finalists can be characterized as follows: as the speed increases and the time to overcome the inter-hurdle blocks decreases, athletes primarily increase the pace of steps between the hurdles. This is clearly demonstrated by the running of 6 out of 8 finalists, for whom the level of correlation in relation to the pace of steps in the best runs exceeds 0,8 ($p < 0,05$). There are far fewer athletes who, as the speed of hurdling increases, reliably improve the time of execution of the hurdle step. Olympic champion G. Holloway, despite the high frequency of running steps between the hurdles, demonstrates running movements with a large amplitude and active interaction with the support. This is what allows him to maintain a purely running character of movements over most of the distance (Table 3).

Conclusions. 1. Modern men's hurdling at a short hurdle distance is characterized by a high tempo of running steps between obstacles, which among leading athletes reaches 5,3-5,5 steps per second. It is very important that with such a high tempo of steps

between obstacles, the run retains its integrity and naturalness, as well as the amplitude necessary for more active interaction with the support and reduction of vertical oscillations of the athlete's CM.

2. High-level athletes, finalists of the 2024 Olympic Games, have the best sports result faster than 13,10 s, the average time of the hurdle step from 0,46±0,02 s, the average pace of steps between the hurdles is 5,24±0,16 steps/s. The electronic time of overcoming the first hurdle varies from 2,46 to 2,61 s. The time of overcoming the inter-hurdle blocks 2-5 is from 3,89 to 4,10 s, the time of overcoming the inter-hurdle sections of blocks 5-9 is from 4,10 to 4,17 s. The time of the finishing section varies from 1,36 to 1,47 s.

3. The run of the Olympic champion G. Holloway (USA) from the beginning to the end of the hurdles distance is appropriate and logical from the point of view of solving technical problems. With the growth of the distance speed and competitive result, the athlete's step rate increases and the speed of the hurdle step increases. Under these conditions, the hurdle step is perceived as one of the running steps, performed with a greater amplitude and along a higher trajectory than the running step, while the entire run along the distance is visually perceived as a single step.

References

1. Mikhaylov N.G., Yakunin N.A., Aleshinskiy S.Yu., Lazarev I.V., Balakhnichev V.V. Biomekhanika baryernogo bega: lektsiya dlya studentov i slushateley Vysshey shkoly trenerov GTSOLIFK. Moscow, Soyuzsportobespecheniye publ. 1982. 33 p.
2. Ogandzhanov A.L. Kompleksnaya otsenka sorevnovatelnoy deyatelnosti i tekhnicheskoy podgotovlennosti mnogobortsev v bar'yernom bege s ispolzovaniyem videoanaliza. Vestnik sportivnoy nauki. 2020. No. 2 pp. 10-14.
3. Stolyar L.M., Kuznetsov V.S., Stolyar K.E. Beg s baryerami: teoriya, metodika obucheniya i trenirovka. Moscow, Prometey publ. 2005. 48 p.

The performance of young football players in terms of their respiratory function, contingent upon their position on the field

UDC 796.332 (612.2)

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Abstract

Objective of the study was to comparative analysis of the key indicators of external respiration in football players across different stages of adolescence.

Methods and structure of the study. The function of external respiration was studied in 102 adolescents aged 12-17 years who study at the Zenit-Izhevsk SSHOR Football Center. All athletes were divided into groups according to two criteria: age and playing role. The Spirolab III device was used, designed for the most complete assessment of the function of external respiration. The following spirometric tests were performed.

Results and conclusions. All indicators of respiratory function, expressed as a percentage of the expected values, undergo the following transformations: an increase from 12 to 13 years, followed by a decrease, sometimes abruptly, in the 13-15 year range, and then a gradual rise in the values of all indicators up to 16-17 years. This pattern suggests a significant decline in the function of external respiration and, consequently, aerobic abilities during the 13-15 year period. Therefore, it is crucial to recognize not only sensitive but also challenging phases in the development of general endurance. It is imperative to conduct a comprehensive analysis of respiratory function indicators in adolescent athletes to accurately assess their aerobic capabilities and pinpoint the onset and conclusion of each sensitive period for the purposeful enhancement of general and, to some extent, specific endurance.

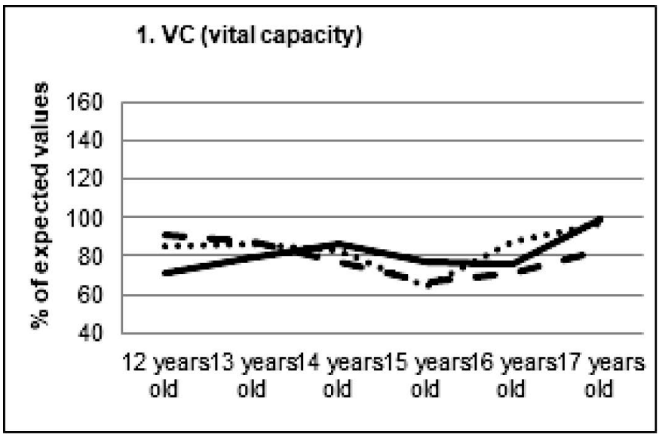
Keywords: *sports training, football, endurance, respiratory function, sensitive periods.*

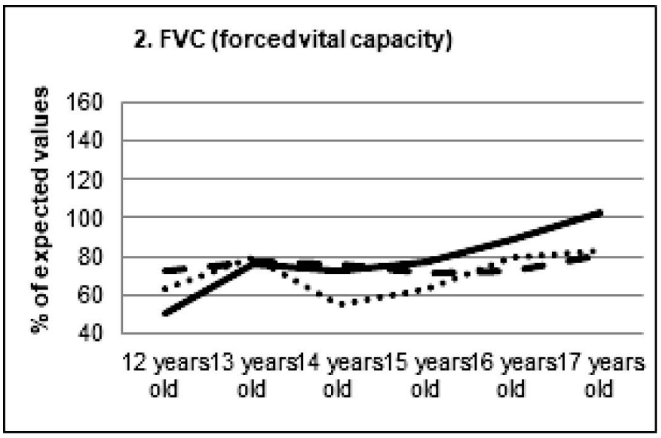
Introduction. In modern sports, a very dangerous phenomenon is often observed: athletes cannot fully reveal their innate, sometimes quite high potential due to excessive forcing of the training process in childhood, adolescence and adolescence. Particularly negative is the fact that the harm caused to health during sports activities at the age of 10-16 years, turned out to be impossible to compensate for in the future [1]. It is known how important general and special endurance are in modern football. The use of methods of influencing the body through the respiratory system enhances the positive effect of training loads on the body, contributes to the formation of more advanced adaptation mechanisms and an increase in the performance of athletes [5]. But at the same time, knowledge of the initial parameters of external respiration of young athletes is absolutely necessary. The planning and implementation of training loads, especially with the "advanced" principle of preparation, should be approached very carefully. The basis for this should be, in particular, truly informative methods for studying the parameters of external respiration of young athletes. However, although the principles of studying the functional capabilities of the external respiration system are well known [2. pp. 140-141], they are rarely used in practice in the required volume of the parameters studied, as a rule, they are limited to simple spirometry. Football, like other team sports, is one of the most successful models in studying the degree of development of reserve and adaptive capabilities of the res-

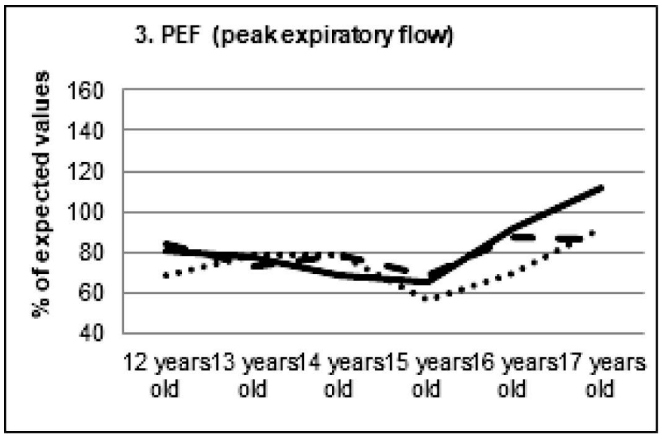
piratory system. At the same time, today the characteristics of external respiration in football players at a young age, when the necessary foundation is laid not only for the high development of physical qualities, but also for sports skills in general, are still insufficiently studied.

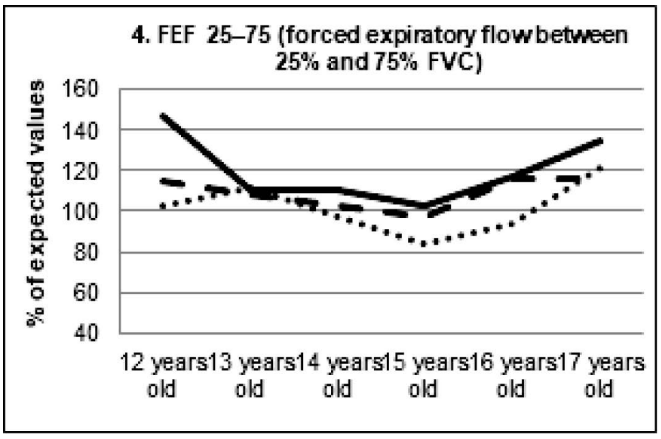
Objective of the study was to comparative analysis of the key indicators of external respiration in football players across different stages of adolescence.

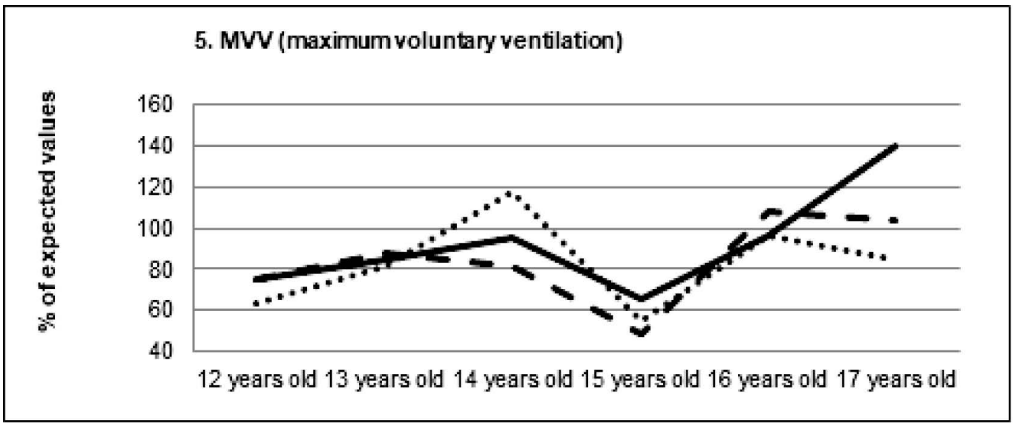
Methods and structure of the study. The respiratory function was studied in 102 adolescents aged











Note: —— *attackers;* – – – – – *midfielders;* ..... *defenders.*

Spirometry indicators (% of expected values) in football players aged 12-17 years, taking into account their playing role

12-17 years, training at the Autonomous Educational Institution of Additional Education of the Udmurt Republic "SShOR for Football "Zenit-Izhevsk". All athletes were divided into groups based on two criteria: age (in one-year increments) and playing position (forwards, defenders, midfielders). The SpirolabIII device, an automatic spirometer designed to provide the most complete assessment of the respiratory function, was used. The following spirometric tests were performed: measurement of forced vital capacity of the lungs, measurement of vital capacity of the lungs, measurement of maximum ventilation of the lungs. Other parameters of external respiration are obtained by calculation in automatic mode. In our study, five main indicators of the respiratory function were used: VC (vital capacity of the lungs in liters); FVC (forced vital capacity of the lungs in liters); PEF (peak expiratory flow); FEF 25-75 (forced expiratory flow between 25% and 75% FVC); MVV (maximum voluntary ventilation in l/min). For each parameter, the percentage ratio between the measured and calculated values was automatically calculated.

Results of the study and discussion. The scientific work interprets the indices of the external respiration function expressed as a percentage of the expected values, taking into account the length and weight of the subjects, gender and ethnic group. This approach allows us to consider the average group values of the studied indices and evaluate their dynamics.

Changes in the VC (vital capacity) index turned out to be multidirectional at the age of up to 13 years in football players of different playing positions. From the age of 13 to 15 years, they also observe a decrease in this index, but not equally: if this index noticeably decreases in defenders and midfielders, then in forwards it is very small. From 15 to 16-17 years, a significant increase in this index is observed in everyone, and the most in defenders, and noticeably less in midfielders and forwards (Figure 1.1).

The FVC (forced vital capacity) index up to 13 years increases to approximately the same level. Then, by the age of 14, there is a significant decline in defenders, while this indicator remains at approximately the same level as at the age of 13 for forwards and midfielders. From 14-15 to 17 years, there is an increase in FVC for all players, but it is highest for forwards. The greatest increase in this indicator is observed in defenders (Figure 1.2). The PEF (peak expiratory flow) indicator is approximately at the same level for all football players from 12 to 14 years old. However, from 14-15 years, this indicator decreases for forwards and midfielders, but especially for defenders – by 1,4 times. At 15-17 years, there is a significant increase in PEF for football players of all playing positions, but the highest indicator was found in forwards, as well as the degree of its increase – by 1,7 times (Figure 1.3).

According to the FEF 25-75 indicator (forced expiratory flow between 25% and 75% FVC), at 12-13 years old, almost maximum values are recorded for each of the positions, but the forwards have the highest value of this indicator. Then, by the age of 15, this indicator noticeably decreases for all football players, especially for forwards. At 15-17 years old, an increase in FEF 25-75 is observed for all football players, to a greater extent for forwards. It is characteristic that only defenders had a small, but still an increase at 17 years compared to the age of 12 (Figure 1.4). The MVV (maximum voluntary ventilation) indicator for forwards and defenders from 12 to 14 years increases slightly, and for midfielders this occurs only up to 13 years. Then, a sharp decrease is observed for everyone from 14 to 15 years. This is especially pronounced for defenders – by 2,1 times. From the age of 15, this indicator increases significantly in defenders and midfielders up to the age of 16, after which it relatively stabilizes. In forwards, MVV increases by 2,1 times by the age of 17 (Figure 1.5). As a result, it was shown that in the age period of 14-15 years, all the studied indicators significantly decrease. A distinctive feature of this age is that it is then, against the background of the ongoing puberty of the body, that the so-called "growth spurt" occurs, that is, a sharp increase in the longitudinal indicators of body size. Due to uncoordinated technique, adolescents spend more energy on performing standard running work than adults. Therefore, their oxygen consumption significantly exceeds the oxygen consumption of adults [5]. Hence the danger of health problems at the age of 13-15 years due to inattention to the established sensitive periods of development of general endurance: 10-12 and 17-18 years [3].

Conclusions. The average value of each of the studied indicators of the external respiration function, as a rule, does not depend on the playing role of the football players (defenders, forwards, midfielders); this applies to each studied age in the range from 12 to 17 years.

For all the studied indicators of the external respiration function, the following age-related pattern of a general nature was revealed: an increase from 12 to 13 years, then a decrease, sometimes sharp, in the period of 13-15 years, and then a gradual increase in the values of all indicators up to 16-17 years. This indicates a significant decrease in the function of external respiration, and, consequently, aerobic abilities at the age of 13-15 years.

In the age range of 13-15 years, intensive training of general endurance is not only inappropriate, but also dangerous for the health of adolescents, which is confirmed by the data we obtained on the decrease in a number of indicators of the external respiration function at the age of 13-15 years. If a significant decrease in the indicators of external respiration function is detected, plans for training young football players should be promptly adjusted in terms of developing general and special endurance, as well as the total duration of training, especially in hot summer conditions, when the need for oxygen increases.

References

1. Beyli I. Dolgovremennaya programma podgotovki i sposobnost k pereneseniyu trenirovochnykh nagruzok v detskom vozraste. Budushcheye molodezhnoy legkoy atletiki. Proceedings of the International Seminar of the International Athletics Foundation. V.B. Zelichenka [ed.]. Moscow: Terra–sport publ., 2004. pp. 18-24.
2. Makarova G.A. Sportivnaya meditsina. Moscow: Sovetskiy sport publ., 2004. 480 p.
3. Nikitushkin V.G. Sovremennaya podgotovka yunykh sportsmenov. Methodological guide. Moscow: Moskomsport publ., 2009. 112 p.
4. Solopov I.N. Fiziologicheskiye effekty metodov napravlennogo vozdeystviya na dykhatelnuyu funktsiyu cheloveka. Volgograd: VGAFK publ., 2004. 220 p.
5. Tuponogova O.V. Trenirovka vynoslivosti u yunykh begunov na sredniye distantsii: Obzor sovremennykh tendentsiy. Vestnik sportivnoy nauki. 2012. No. 1. pp. 28-33.

The correlation between the subjective perception of health and the characteristics of cardiovascular function in swimmers and non-swimmers

UDC 159.91+ 371.72+ 797.2

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Abstract

Objective of the study was to discern the characteristics of the connection between the state of health and the control of heart rate in older preschoolers who participate in swimming classes and those who do not engage in sports activities.

Methods and structure of the study. The study involved 44 participants aged between 5 and 7 years old, with an average age of 6,29 ± 0,7 years. To assess the internal picture of health, we employed the Rapid Diagnosis of the Child questionnaire and the Attitude to Health questionnaire. To analyze the cardiac rhythm variability, we utilized the OMEGA-M software and hardware complex.

Results and conclusions. The characteristics of the internal health status vary between children who participate in swimming activities and those who do not. Children who participate in swimming activities exhibit a lower level of internal health compared to their peers who do not participate. The level of internal health is linked to the specific features of heart rate variability. Preschoolers who participate in swimming activities demonstrated an increase in the activity of the sympathetic division of the autonomic nervous system during cardioregulation, suggesting a moderate stress on the body's regulatory systems.

Keywords: *internal health picture, heart rate variability, autonomic nervous system, preschoolers.*

Introduction. It is known that motor activity from the earliest stages of ontogenesis participates in the formation of various functions of the body, which is due to the connection of the motor zones of the central nervous system with the centers of the autonomic nervous system, providing neurohumoral regulation of vital functions [4]. A number of studies have shown that the activity of proprioceptors is associated with the tone of the ANS, while the greatest role in the structure of motor activity is given to organized movements, which in preschool children are most intensively formed during swimming lessons [8, 11]. In turn, the body's resistance to various external influences is ensured by adaptive processes, among which one of the key roles is played by the circulatory system, and the features of its regulation by the ANS, manifested in heart rate variability (HRV) indicators, are informative for studying the adaptive capabilities of the body [2, 3, 7, 10]. At the same time, the features of adaptation to external factors, including the preservation and strengthening of health, are included in the construct of the "internal picture of health" (IPH), which is currently defined as a dynamic representation and attitude to one's health, expressed in the awareness of the value of health and in the desire to preserve and improve it [6].

It has been established that one of the most effective means of health formation in preschoolers is swimming, which affects the child's body, promoting healthy growth and development, increasing its resistance to pathogenic factors [1, 8, 9, 11]

All of the above indicates the need for a more detailed study of the features of heart rate variability and IPH in swimming and non-swimming children.

Objective of the study was to discern the characteristics of the connection between the state of health

and the control of heart rate in older preschoolers who participate in swimming classes and those who do not engage in sports activities.

Methods and structure of the study. The study involved 44 subjects of senior preschool age (average age 6,29±0,7 years).

The features of the internal picture of health were identified using the following methods: "Express diagnostics of a child" [5], the questionnaire "Attitude to health" by R.A. Berezovskaya, adapted by E.E. Ruslyakova [6].

The "Express diagnostics of a child" method is a conversation with the subject, during which the experimenter asks to name as many actions as possible that contribute to maintaining health. The questionnaire "Attitude to health" consists of 10 questions, to which from 5 to 10 ready-made answer options are offered. In our study, we used a simplified and age-adapted questionnaire text for children, as well as an adapted response ranking system.

The study of the features of heart rate variability was carried out using the OMEGA-M software and hardware complex. The registration of children's heart rate variability was carried out in two different conditions: at rest and during a conversation about their health. The indicators of the time analysis of HRV, the indicators of the spectral frequency analysis, and the degree of centralization of heart rhythm control were assessed [2].

Results of the study and discussion. At the first stage, the level of formation of the internal picture of health in preschoolers was analyzed. It was found that in both subgroups the average level prevails (70,4% among those attending and 59,3% among those not attending the swimming section). Among children involved in swimming, the low level is in second place – 29,4%, and among children not involved in swimming - a high level – 29,6%.

Next, we compared the level of the internal picture of health in swimming and non-swimming children. It was shown that there are differences in both the overall level of the internal picture of health and its individual components at a significance level of $p \leq 0,05$ (Mann-Whitney U-test).

It was found that the overall level of attitude to health and the levels of components of the internal picture of health (1,38 ± 0,75 not attending and 0,94 ± 0,74 attending the section) are significantly higher in children who do not attend the swimming section. That is, children who do not attend the section value health more. The next stage was to search for the relationships between systematic swimming lessons, the characteristics of cardioregulation and the level of the internal picture of health of older preschool children. It was found that both the level of the internal picture of health (-0,387, at $p \leq 0,05$) and its individual components, such as behavioral (-0,526, at $p \leq 0,05$) and motivational-value (-0,402, at $p \leq 0,05$) have an inverse correlation with the parameter "attendance at the swimming section".

Thus, the more children attend the swimming section, the lower their level of the internal picture of health and its components. In addition, an inverse correlation was found between the attitude to health and children's swimming lessons (-0,366, at $p \leq 0,05$). The analysis of the relationship between the characteristics of heart rate variability and the components of the internal health picture in children showed that in the group of those who do not attend the section, there is an increase in the activity of the sympathetic part of the autonomic nervous system during a conversation about health in children with a high level of the behavioral and motivational-value components of the internal health picture.

In turn, in children who attend the swimming section, but at the same time have a high level of the internal health picture and its individual components, during a conversation about health, there is a decrease in the centralization of heart rate control and an increase in the parasympathetic influences on the heart rate from the autonomic nervous system.

Discussion of the results. As noted above, according to research in the field of physical education, sports and medicine, swimming has a positive effect on children's health, and children who regularly play sports have fewer health problems, and, thus, less often experience emotional reactions associated with illness [8, 11]. The absence of negative emotions from experiencing an illness does not actualize the need for health preservation, since physical education and, in particular, swimming, forms a health-preserving model of behavior [3]. This is confirmed by the results of the analysis of the variability of the heart rate of preschoolers, which showed that in children involved in swimming, a high level of the internal picture of health positively correlates with the level of the spectrum power of the very low-frequency component of the HRV. Consequently, the higher the internal picture of health, the stronger the influence of the sympathetic, suprasegmental parts of the autonomic nervous sys-

tem on the heart rate in a situation of a conversation about health and, as a consequence, moderate stress of the regulatory systems of the body.

Conclusions. The features of the internal picture of health differ in children who attend and do not attend the swimming section, and children who attend the section demonstrate a lower level of the internal picture of health compared to their peers who do not attend the section. The level of the internal picture of health is associated with the features of the variability of the heart rate, while in preschoolers who attend the swimming section, during a conversation about health, an increase in the activity of the sympathetic part of the ANS in the process of cardioregulation was found, which indicates a moderate stress of the regulatory systems of the body.

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References

1. Aleksandrov S.G., Belinskiy D.V., Makhonina A.V. Vliyaniye zanyatiy ozdorovitelnym plavaniyem na fizicheskoye razvitiye i dvigatelnuyu podgotovlennost doshkolnikov 5-7 let. Biznes. Obrazovaniye. Pravo. 2020. No. 2 (51). pp. 361-368.
2. Baevskiy R.M., Chernikova A.G. Analiz variabelnosti serdechnogo ritma: fiziologicheskiye osnovy i osnovnyye metody provedeniya. Cardiometry, publ. 2017. No. 10. pp. 66-76.
3. Morozova M.A., Anfilatova O.V., Podrezova L.N., Erdyakova A.A. Vliyaniye zanyatiy ozdorovitelnym plavaniyem na pokazateli kardiorespiratornoy sistemy detey s tyazhelymi narusheniyami razvitiya. Nauchnoye obozreniye. Pedagogicheskiye nauki. 2022. No. 5. pp. 10-14.
4. Erokhin A.N., Gryaznykh A.B., Menshchikova Yu.S. Dvigatelnaya aktivnost i funktsionalnoye sostoyaniye vegetativnoy nervnoy sistemy. Chelovek. Sport. Meditsina. 2005. No. 1 (4 (44)). pp. 341-343.
5. Nikolaeva E.I., Fedoruk V.I., Zakharna E.Yu. Zdorovyesberezheniye i zdorovyeformirovaniye v usloviyakh detskogo sada. Moscow: Detstvo-Press publ., 2014. 240 p.
6. Ruslyakova E.E. Otnosheniye k zdorovyu i vnutrennyaya kartina zdorovya shkolnikov. Mir nauki. Pedagogika i psikhologiya. 2015. No. 3. 43 p.
7. Tiwari R., Kumar R., Malik S., Raj T., Kumar P. Analysis of Heart Rate Variability and Implication of Different Factors on Heart Rate Variability. Curr Cardiol Rev. 2021. No. 17(5). e160721189770.
8. Pirjol I., Oravitan M., Monea D. A review on the influence of swimming on posture deficiencies. Studia Universitatis Babeş-Bolyai Educatio Artis Gymnasticae. 2023. No. 68. pp. 63-76.
9. Ruedl G., Cocca A., Wirnitzer K.C., Tanous D., Drenowatz C., Niedermeier M. Primary school children's health and its association with physical fitness development and health-related factors [J]. AIMS Public Health. 2024. No. 11(1). pp. 1-18.
10. Shaffer F., Ginsberg J.P. An Overview of Heart Rate Variability Metrics and Norms. Front. Public Health. 2017. No. 5. 258 p.
11. Vranesic - Hadzimehmedovic D., Mirvic E., Masic S., Hodzic A., Kuduzovic A. The effects of swimming on body posture in preschool age children. Multidisciplinarni Pristupi u Edukaciji i Rehabilitaciji. 2024. No. 6. pp. 66-73.

The role of adaptive physical education in the family of stroke sur vivors

UDC 796

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Abstract

The purpose of the study: to investigate modern approaches to managing the condition of patients after stroke and to determine the role of physical education in the family circle.

Methodology and organization of research. Based on the results of a survey of family members of stroke survivors, we identified the need for the knowledge that will allow us to continue the process of motor rehabilitation initiated in the hospital. A training course on motor recovery of stroke patients has been developed. The course program is intended for use at home with the participation of the patient's family. The name is "Stroke Recovery School".

Research results and conclusions. The course is based on the Bobat concept, includes exercises from the techniques of PFM, Exart and joint gymnastics, as well as clinical recommendations for postural correction, safe movement and verticalization of patients. It is aimed at training relatives of stroke survivors, students and aspiring specialists in physical rehabilitation. The course lasts 10 academic hours (5 classes of 2 hours each), includes lectures and practice with repetition of the material.

Keywords: *stroke, questionnaire, family rehabilitation, adaptive physical education.*

Relevance. According to statistics, more than 80% of stroke patients face disabilities, almost 20% of them become severely disabled and in need of constant care. The high level of disability requires increased effectiveness and continuous improvement of rehabilitation treatment. However, the stay of patients in hospitals and sanatoriums is strictly limited, which emphasizes the need for regular adaptive physical education at home. Due to physical and cognitive limitations, the importance of the family's role in the rehabilitation process increases, since it is the loved ones who can create a supportive and motivating atmosphere for adaptation and recovery [3]. The process of physical rehabilitation after a stroke is a long, complex and systematic exercise. Recovery of motor functions is carried out in stages, moving from simple to complex exercises, from general to particular. Continuity and consistency of physical rehabilitation remain the most important aspects [1, 2, 4]. Currently, rehabilitators receive only 1-2 sheets of standard recommendations for performing physical exercises at home. Some of these exercises are difficult to do. With this approach, it is impossible to ensure a continuous recovery course. In conditions of home care, the patient and his relatives are forced to search for information via the Internet (mainly video hosting sites) and advice from such people. This information is often fragmentary, situational, and unrelated to the overall process of movement recovery, which significantly reduces the effectiveness of such "self-educational" practice.

The purpose of the study. To investigate modern approaches to managing the condition of patients after stroke and to determine the role of physical education in the family circle.

Methodology and organization of research. An analysis of the number of video views and active quoting of texts on the topic on social networks indicates a high interest of the general public in knowledge about the recovery of relatives after a stroke. According to a sociological survey of one hundred

people whose relatives suffered a stroke, 92% consider adaptive physical education classes to be the crowning achievement of successful rehabilitation. The frequency of classes is most often daily — 58% answered this way, while 36% preferred an interval of 2-3 times a week. 96% of respondents supported the need for a rehabilitation training course. In this situation, we propose to train the patient's family at the acute stage in the hospital. Even with the obvious advantages, subsequent adaptive physical education at home requires a competent approach. The exercise program should be developed by a specialist taking into account the unique characteristics of the patient. A doctor or rehabilitologist can teach the family how to exercise safely and correctly, which minimizes the risk of injury. We have developed a training course on motor recovery in stroke patients for its use at home by the patient's family. The name is "Stroke Recovery School".

The results of the study and their discussion. The curriculum of the course is based on the Bobat concept [4]. Exercises from the PNF technique [1], Exart techniques and joint gymnastics are used. Clinical recommendations on postural correction, safe movement and verticalization of patients are used. The course is designed for people caring for stroke patients. This course can be used in the training of students and novice specialists in the field of physical rehabilitation. After completing the course, students will:

- have an understanding of stroke and its complications, movement control and the concept of neuroplasticity, the basic principles of motor rehabilitation, and setting goals and objectives in rehabilitation;
- be able to position and safely move patients;
- know the sequence of learning basic motor skills according to the stages of movement recovery after a stroke;
- they are able to teach the patient guiding exercises for mastering holistic movement. The course duration is 10 academic hours. For convenience, we have divided the course into 5 classes of 2 academic hours each. The course structure includes a lecture and a practical part with a demonstration and repetition of the material covered.

Conclusion. Thus, adaptive physical education in the family of stroke survivors is an important step towards recovery. Modern technologies also play a significant role in this process. Many applications and online courses have been developed that allow you to practice adaptive physical education at home under the guidance of a virtual instructor. However, despite the availability of such technologies, personal contact and family involvement remain indispensable for providing emotional support and motivation.

References

1. Kovalchuk V.V. Theoretical prerequisites and practical aspects of adequate management and effective rehabilitation of patients after stroke: monograph. Moscow: AST 345, 2021. 423 p. color. ill., table.; 23. — ISBN 978-5-6041430-7-0.
2. Latysheva V.Ya., Chechetin D.A., Yadchenko N.M. et al. Rehabilitation of patients' motor activity in the post—stroke period: a practical guide for doctors – Gomel: State Institution "RNPC RMiEH", Educational institution "GSMU", 2015 - 78 p. - UDC 615.825:616.831-005.
3. Parfenova L. A., Fedorova N. I., Burtseva E. V. Ways to improve health and fitness competency of parents of children with intellectual disabilities. Teoriya i praktika fizicheskoy kultury. 2019. No. 6. p. 77.
4. Rain S., Linzi Meadows, Mary Lynch-Ellerington Bobat-the concept. Theory and Clinical Practice in Neurological Rehabilitation. Meadows Lenses. – Publishing house: Cyrillic Alphabet, 2013. – p. 320. –, 2013. 320 p. ISBN: 978-5-9052-2668-7.

Characteristics of physical rehabilitation for stroke survivors, evaluated through the lens of their psychological and emotional well-being

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Abstract

Objective of the study was to assess the correlation between the indicators of the psychological and emotional state of patients following a stroke and their motivation to participate in physical therapy during the rehabilitation process.

Methods and structure of the study. The psychological assessment was performed using the Hospital Anxiety and Depression Scale, the Integrative Anxiety Test, the Asthenia Assessment Scale, the Compliance Scale, and the Short Neuropsychological Examination of the Cognitive Sphere. The study involved 35 participants aged between 60 and 80. The study was conducted at the Clinical Hospital No. 2 in Novosibirsk.

Results and conclusions. The findings of the research revealed a strong correlation between depression and a decrease in physical activity, as well as between the level of adherence to treatment and the performance of physical exercises for fine motor skills and memory. The data obtained indicate that the creation of rehabilitation programs for elderly patients with these characteristics should encompass not only conventional measures aimed at restoring motor and cognitive abilities, but also enhancing motivation and the significance of the rehabilitation process itself. This can be achieved through the use of innovative engineering solutions in the organization of physical therapy in healthcare and rehabilitation facilities, as well as through providing competent social and psychological support during treatment and rehabilitation.

Keywords: *rehabilitation after stroke, therapeutic exercise, psycho-emotional state, motivation for recovery, elderly people.*

Introduction. Currently, rehabilitation measures for patients who have suffered a stroke are becoming increasingly diverse: new engineering products (stabiloanalyzer with biofeedback, VR suit, computer games using virtual reality technologies and cognitive simulators, etc.) and social solutions (use of psychological and medical means to improve the psychoemotional state, the relationship between the patient and medical staff, interaction with the patient's immediate environment, etc.) are being developed. As studies show, the involvement of patients after a stroke in the rehabilitation process through the use of virtual reality to perform routine daily activities has proven its effectiveness in providing short-term improvements in cognitive nature [7]. Along with this, maintaining constant communication with the attending physician increases the level of trust in the medical staff and the willingness of patients to actively participate in the rehabilitation process by reducing the uncertainty in obtaining the necessary knowledge [5]. In this regard, competent social and psychological support aimed at increasing the motivation for patient recovery is becoming an important aspect of physical rehabilitation.

Objective of the study was to assess the correlation between the indicators of the psychological and emotional state of patients following a stroke and their motivation to participate in physical therapy during the rehabilitation process.

Methods and structure of the study. The research was conducted jointly with E.A. Kudishina during 2023 on a sample of patients who had suffered a stroke at Novosibirsk City Clinical Hospital No. 2. The

total number of participants in the experiment was 35 people aged 60 to 80 years.

Research methods: Hospital Anxiety and Depression Scale (HADS) adapted by A.V. Andryushina, M.Yu. Drobizhev; integrative anxiety test (authors: A.P. Bizyuk, L.I. Wasserman, B.V. Iovlev); asthenia assessment scale (MFI-20) [2]; Morisky-Green compliance scale [1]; brief neuropsychological examination of the cognitive sphere (BNCS) [4]. Data were collected using printed forms with the written consent of the subjects in the first week after the stroke. Statistical analysis was performed using jamovi Desktop software.

Results of the study and discussion. The analysis of the mean values on the hospital anxiety and depression scale showed values within the normal range (M=7,5 and M=7,6, respectively, with a maximum possible value of 21), while the mean values on the integrative anxiety test were also mostly at the normal level, with the exception of the asthenic and phobic components of personal anxiety (M=6,63 and M=6,6 with a maximum possible value of 9), as well as the data on the asthenia assessment scale (the highest mean value was revealed on the physical asthenia scale (M=12,6 with a maximum possible value of 20). The obtained results allow us to conclude that elderly patients after a stroke generally do not demonstrate typical manifestations of depression and anxiety, but at the same time, in the structure of anxiety, they are characterized by lethargy, fatigue, sleep problems, fatigue, self-doubt, and ideas about their own uselessness. According to the compliance scale, elderly patients demonstrated low adherence to treatment (M=2,21 with a maximum value of 4). An assessment of the data using the brief neuropsychological assessment of the cognitive sphere showed that the worst results were achieved in tasks related to memory work (mean values ranged from 1,9 for tasks on constructive praxis, finding similarities, to 2,2 for tasks on working memory).

Thus, despite the normative indicators of anxiety and depression in elderly patients after stroke, it was found that the sample is characterized by low readiness for treatment, high fatigue and difficulties in performing tasks that require the use of memory functions. In fact, the obtained results give reason to assume the presence of resistance in this group of patients to the rehabilitation and treatment process.

As a result of the correlation analysis using Spearman's Rs-criterion, significant relationships were found between the characteristics of the emotional state of elderly patients after stroke with their cognitive characteristics and readiness for treatment.

Thus, high values of depression correspond to high values of physical asthenia (Rs=0,75, $p<0,01$), asthenic component of anxiety (Rs=0,7, $p<0,01$), decreased activity (Rs=0,53, $p<0,01$), understanding of commands to perform motor exercises (Rs=0,52, $p<0,01$). This means that the severity of the depressed state and decreased mental activity are combined with decreased motor activity, increased fatigue, tiredness, sudden mood swings, and refusal to perform motor techniques. This result suggests low efficiency of the traditional approach to organizing therapeutic exercise in elderly patients after a stroke, since patients are likely to avoid physical activity in every possible way and critically perceive the need to perform exercises. Low compliance values correspond to high values of constructive praxis (Rs=-0,51, $p<0,01$) and a set of sequences (Rs=-0,45, $p<0,01$). This means that a negative attitude towards treatment is combined with a clearer performance of optical-spatial actions (error-free repetition of drawings from a sample) and repetition of previously made drawings from memory. In other words, those patients whose memory is generally functioning normally are skeptical about the treatment and recovery process, which may be related to their negative ideas about the future compared to their memories of a typical lifestyle in the past.

Discussion of results. A study of the characteristics of the psychoemotional state and readiness for treatment and motor activity in elderly patients after a stroke showed the need to introduce new rehabilitation technologies. These can be proven techniques of gamification, stabilotraining [3], virtual reality [7], as well as fundamentally new systems for organizing therapeutic exercise. An example of such a development is the rehabilitation complex "Gefest", created at NSTU within the framework of the "Priority 2030" program, which includes a device that helps the patient restore typical walking patterns, and audiovisual accompaniment that allows you to restore in memory iconic routes characteristic of the area in which a person lives, which adds a semantic component to physical activity, while involving memory and emotions, i.e. the work of both hemispheres at once, which corresponds to the hypothesis of complementary dominance [6].

Conclusions. The results of the study showed the presence of significant links between depression and

decreased physical activity, as well as between the level of adherence to treatment with the performance of physical exercises for fine motor skills and memory. The data obtained allow us to conclude that the development of rehabilitation complexes for elderly patients with the characteristics considered should include not only traditional measures aimed at restoring motor activity and cognitive activity, but also increasing the motivation and meaningfulness of the rehabilitation process itself, which is possible with the use of new engineering products in the process of organizing therapeutic exercise in medical and rehabilitation institutions and competent social and psychological support during treatment and rehabilitation.

References

1. Lukina Yu.V., Martsevich S.Yu., Kutishenko N.P. Shkala Moriski-Grina: plyusy i minusy universalnogo testa, rabota nad oshibkami. Ratsionalnaya Farmakoterapiya v Kardiologii. 2016. No. 12 (1). pp. 63-65.
2. Postkovidnaya asteniya. Algoritmy diagnostiki i lecheniya. Terapiya, publ. 2022. No. 8. pp. 90- 100.
3. Suvorova T.N., Gribova N.P. Dinamika kognitivnykh i psikhoemotsionalnykh narusheniy v rannem vosstanovitelnom periode ishemicheskogo insulta pri provedenii reabilitatsionnykh meropriyatiy s primeneniyem stabilotreninga. Chelovek i yego zdorovye. 2023. No. 26 (3). pp. 29-35.
4. Tonkonogiy I.M. Kratkoye neyropsikhologicheskoye obsledovaniye kognitivnoy sfery (KNOKS). Moscow: Per Se publ., 2010. 69 p.
5. Kayes N.M., Cummins C., McPherson K.M., Worrall L., Bright F.A. S. Developing connections for engagement in stroke rehabilitation. Brain Impairment. 2022. No. 23(1). pp. 42-59.
6. Kitchen N.M., Dexheimer B., Yuk J., Maenza C., Ruelos P.R., Kim T., Sainburg R.L. The complementary dominance hypothesis: a model for remediating the ‘good’ hand in stroke survivors. Journal of Physiology. 2024.
7. Oliveira J., Gamito P., Lopes B., Silva A.R., Galhordas J., Pereira E., Fantasia A. Computerized cognitive training using virtual reality on everyday life activities for patients recovering from stroke. Disability and Rehabilitation: Assistive Technology. 2020. No. 17 (3). pp. 298-303.

Features of the implementation of the concept of «mental health» in the field of adaptive physical culture in the republic of tatarstan

UDC 796

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Abstract

The purpose of the study. To determine the specifics of the implementation of the "Mental Health" Concept in the field of adaptive physical culture (AFC), taking into account the target groups.

Methodology and organization of the study. The analysis of the current state has been carried out, the place and role of adaptive physical culture in the system of comprehensive support for people with mental disabilities in the Republic of Tatarstan has been established, the target groups of the Concept in the field of AFC have been identified. A sociological study aimed at identifying interest and motivation (preferences) in sports rehabilitation and physical education classes, taking into account their requests, opportunities and educational needs.

The results of the study and conclusions. The Tatarstan Republican regional branch of the All-Russian Public Charity Organization "Special Olympics of Russia" and the regional branch of the All-Russian Federation of Sports for Persons with Intellectual Disabilities are actively developing adaptive physical education and sports for persons with ASD and DMN in the Republic of Tatarstan. Social and sports work is carried out jointly with the Department of Adaptive Physical Culture of the Volga State University of Physical Culture, Sports and Tourism. The Tatarstan branch of the Special Olympics unites more than 7,000 participants, including athletes and volunteers, regular trainings and classes on adaptive sports technologies are held. The organization's partners include more than 100 institutions, including correctional schools, rehabilitation centers, sports federations, and charitable foundations. Great importance is given to the preparation of athletes for participation in All-Russian competitions. The University provides classes for 210 people, including children with ASD, in various sports. Correctional and developmental classes for preschoolers and young people with disabilities are organized, modern physical education and wellness technologies are used. The positive experience of cooperation was included in the AFC Concept. Activities are being implemented in various areas, including professional development and the integration of Special Olympics programs into educational institutions. Systematic work is underway with families of children with mental disabilities, joint activities and consultations are conducted.

Keywords: *The concept of "Mental health", autism, intellectual disabilities, adaptive physical education, family, additional education.*

Introduction. The World Health Organization (WHO) estimates that 10 to 20% of children and adolescents experience mental disorders. Data on the prevalence of mental health problems among children vary significantly depending on the country, region, and criteria used to make a medical diagnosis. Psychiatric disorders such as anxiety, depression, attention deficit hyperactivity disorder (ADHD), and autism, which are characterized by affective and behavioral reactions, predominate among children. Numerous studies emphasize the importance of including adequate physical exercise in comprehensive therapy programs that aim to support and develop the psychophysical capabilities of these children [1, 3, 5]. Since January 1, 2022, the Republic of Tatarstan (RT) has been implementing the Concept of Comprehensive support for People with autism spectrum Disorder and Other mental disor-

ders (hereinafter referred to as the Concept). The normative and methodological basis of the Concept was based on the provisions of the Universal Declaration of Human Rights, the United Nations Convention on the Rights of the Child, the United Nations Convention on the Rights of Persons with Disabilities, as well as conceptual ideas of L.S. Vygotsky on compensation for impaired functions, on the leading role of learning in development, on the importance of collective forms of activity for the formation of a special child's personality. The concept is aimed at ensuring the rights of people with autism spectrum disorders (ASD) and other mental disorders (DMD) to participate fully in public life, receive high-quality education at all levels, qualified medical care, habilitation, rehabilitation, socialization, legal protection, and professional activity.

According to the terms and definitions used in the Concept, "mental disorders" are mental and mental (intellectual) disorders that limit a person's ability to serve themselves, study, engage in work, and complicate the process of integration into society.

In this regard, comprehensive support for people with ASD and DMN should be aimed primarily at eliminating problems related to speech, emotional and motor development, building communication with the outside world, assimilation of social norms, as well as creating conditions in the Republic of Tatarstan that allow for early detection of children with autism spectrum disorders. and other mental disorders and their comprehensive support throughout life. In addition, it is necessary to work with the whole family: explaining to parents and relatives the basic essence of autism spectrum disorders and their treatment, the specifics of building interaction with people with ASD and DMN to resolve behavioral problems, involving parents in the educational process [6].

The purpose of the study. To determine the specifics of the implementation of the "Mental health" Concept in the field of adaptive physical culture, taking into account the target groups.

Methodology and organization of the study. The analysis of the current state of the integrated support system for people with ASD and DMN in the Republic of Tatarstan is carried out. The place and role of adaptive physical culture in this field has been established. The target groups of the AFC Concept have been identified (Figure 1). The current situation in the system of additional physical culture and sports education for children with mental disabilities (including ASD) is outlined. A sociological study was conducted aimed at identifying interest and motivation (preferences) in sports rehabilitation and physical education classes, taking into account their requests, opportunities and educational needs.

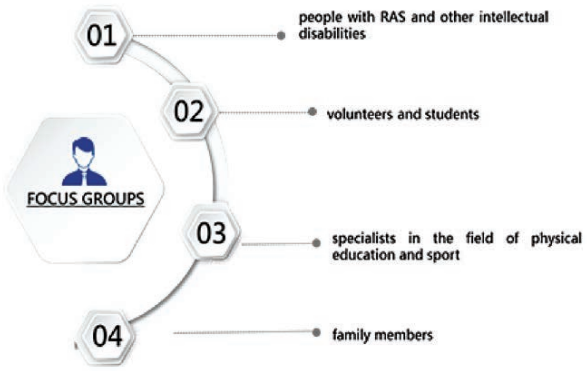

Figure 1 – Target groups of the Mental Health Concept

Prospects for development, ways to solve problems, and measures to involve representatives of target groups in the field of adaptive physical education are outlined.

The results of the study. A significant contribution to the development of adaptive physical culture and adaptive sports for people with ASD and DMN in the Republic of Tatarstan is made by the Tatarstan Republican regional branch of the All–Russian Public Charity Organization for the Mentally Disabled "Special Olympics of Russia" (hereinafter - TRRO SOR) and the regional branch of the All-Russian Public Organization "All-Russian Federation of Sports for People with Intellectual Disabilities" in Republic of Tatarstan (RO VFSsLIN in the Republic of Tatarstan). The social and sports work of these non–profit organizations is carried out in close cooperation with the Department of Adaptive Physical Culture of the Volga State University of Physical Culture, Sports and Tourism (hereinafter - the University).

Today, the Tatarstan branch of the Special Olympics unites more than 7,000 participants, including athletes, coaches, volunteers, and family members raising children with mental disabilities. Sports training and physical education classes on adaptive sports technologies and additional education programs in the field of AFC and sports are conducted on a regular basis [2, 4].

TRRO SOR's partners are more than 100 organizations (38 special correctional schools, 10 rehabilitation centers for children, 20 general education schools, 10 preschool institutions, 7 sports federations, 2 boarding schools, 6 psycho-neurological boarding schools, non-profit and public organizations, The Sun in the House, the Center for the Development of Adaptive Sports of the Republic of Tatarstan, Regional branch of the All-Russian Organization of Parents of disabled children of the Republic of Tatarstan, charitable foundations "Angel of Faith", "Strength in children", etc.).

The preparation of athletes for participation in All-Russian competitions, which promote the social integration of special people with mental disabilities into society and the formation of a positive image of the Republic of Tatarstan in the field of AFC and adaptive sports, is of great importance in the work of the TRRO SOR.

At the University's sports facilities (ULK, DVVS, CGVS, Burevestnik), 10 specialist teachers of the department are engaged on a voluntary basis with children with mental disabilities (including ASD) in groups formed taking into account differentiated conditions, the severity of violations and sports preferences. The total enrollment is 210 people (65 of them with ASD).

Classes are conducted on the basis of additional general education programs of physical culture and sports orientation in various sports (floorball, swimming, mini-football, table tennis, adaptive tourism, snowshoeing, skiing, adaptive gymnastics) [5].

In addition, correctional and developmental activities have been organized for preschool children (aged 2 years and older) and young people with disabilities over the age of 18. The following physical education and wellness technologies are used during classes: cerebellar stimulation techniques; articulatory gymnastics; logorhythmics; relaxation; psychohymnastics. Individual rehabilitation sessions with people with severe (multiple) disorders are given.

The significant positive experience of the joint activities of the TRO SOR and the AFC department was included in the descriptive part of the Concept and was taken as the basis for the development of measures for its implementation in the field of AFC (Figure 2).

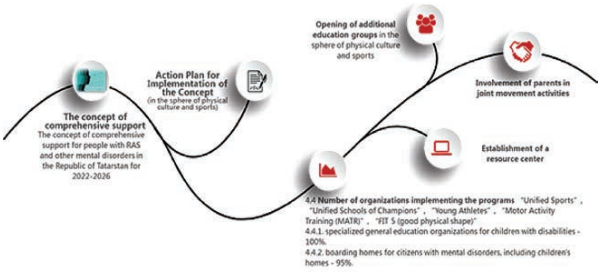

Figure 2 - Action Plan for the implementation of the "Mental Health" Concept

As part of the approved activities (Figure 2), systematic systematic work is being carried out in the following areas:

- the functioning of the RAS and DMN resource center in the field of AFC (https://minsport.tatarstan.ru/mentalnoe-zdorove.htm);

- improving the professional competence of specialists in organizing physical culture and sports activities for children with ASD and DMN (advanced training courses with a total enrollment of 135 people); - regular trainings in additional education groups of physical culture and sports orientation (the total number of students involved is more than 3,500 children);

- implementation and implementation of Special Olympics programs in 100% of special correctional schools and preschool educational institutions in the Republic of Tatarstan ("Unified Sport", "United Schools of Champions", "Young Athletes", "Motor Activity TRAINING PROGRAM", "FIT 5". In social service institutions (rehabilitation centers, neuropsychiatric boarding schools), the Special Olympics programs implemented since 2021 ("Young Athletes", "FIT 5 (good physical shape)", "Physical Activity Training (MATR)") continue to be used. In rehabilitation centers in 2024, 7,236 people were provided with services for the development of adaptive physical culture and informing citizens about the possibilities of AFC classes.

It is important to note that systematic work has been built with families raising children with mental disabilities. Joint physical activities, psychological and pedagogical consultations for parents, and training for parents and other legal representatives on effective technologies and methods of helping people with disabilities are organized weekly at the University. The parent center "Trust and Communication" has been established, the purpose of which is to provide counseling, lectures and prac-

tical classes with family members raising children with mental disabilities on the issues of accompanying children's motor activity at home. Classes for parents are conducted in various forms with the involvement of leading experts in the field of psychology, education, medicine and AFC.

Conclusion. The implementation of the Mental Health Concept in the field of AFC demonstrates a positive trend in the interest of families raising children with mental disabilities in physical activity, increasing the competence of AFC specialists, and increasing the number of people with ASD and DMN who regularly engage in various types of AFC. It should be noted that all of these activities are in the field of scientific interests of graduate students of the Department of AFK University. The obtained scientific results are broadcast at scientific and practical conferences and published in scientific journals.

References

1. Andreev, A.A., Fominykh A.V., Konovalov I.E., Parfenova L.A., Chernyaev A.A. Psychophysical rehabilitation of schoolchildren with autism spectrum disorder by means of adaptive physical culture in an inclusive educational institution. Adaptive physical culture. 2019. Vol. 80, No. 4, pp. 22-24.
2. Gilmutdinova, R.I., Parfenova L.A. Students professional competences building within grant projects. Teoriya i praktika fizicheskoy kultury. 2018. No. 11. p. 5
3. Glazkova, G.B. A model of a situational physical culture and educational center for children with disabilities/ G.B. Glazkova, L.A. Parfenova, E.V. Makarova – Physical culture and health. 2021. № 3 (79). Pp. 80-84.
4. Parfenova, L.A., Lebedev E.V., Tsukhlov N.A. Concept of educational strategy of special olympics Russia, Teoriya i praktika fizicheskoy kultury. 2022. No. 2. p. 85.
5. Parfenova L.A., Gerasimov E.A., Makarova E.V. Floorball training model for schoolchildren with intellectual retardations to qualify for adaptive GTO complex tests. Teoriya i praktika fizicheskoy kultury. 2019. No. 4. pp. 59-61.
6. Fedorova, N.I. Competence of parents of children with intellectual disabilities in the field of adaptive physical culture/ N.I. Fedorova, L.A. Parfenova Adaptive physical culture. 2020. Vol. 81 , No. 1. pp. 6-7.

Training younger students with intellectual disabilities to pass the standards of the VFSK TRP using a specialized training apparatus

UDC 796.015

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Abstract

Objective of the study was to demonstrate the efficacy of the training apparatus in the context of physical education for elementary school students with mild intellectual disabilities.

Methods and structure of the study. The experiment was carried out in the afternoon, during additional physical education classes, at the Amur Region State Educational Institution «Special (Correctional) Secondary School No. 7 in Blagoveshchensk». Two groups were formed, each consisting of 8 participants. The lessons were conducted three times a week for 40 minutes. The study employed methods of pedagogical testing, pedagogical observation, and mathematical statistics.

Results and conclusions. The utilization of a drum-like training apparatus empowers individuals with intellectual disabilities to acquire the motor skill of performing pull-ups on both high and low bars with minimal deviations from proper technique. Engaging in exercises on this apparatus fosters strength development, as evidenced by the outcomes of standing and wrist dynamometry at the conclusion of the experiment ($p<0,05$); and alleviates anxiety and fear when undertaking the strength test of the VFSK TRP for individuals with intellectual disabilities.

Keywords: *younger schoolchildren with mental retardation, strength abilities, drum-type training device, pull-ups on a horizontal bar, VFSK GTO.*

Introduction. In the study of the dynamics of development of motor abilities of children with mild mental retardation, the results covered in the works of V.M. Mozgovoy (1977) [5], A.S. Samylichev (1985) [6], A.A. Dmitrieva (1987) [4], E.S. Chernik (1992) [7], N.V. Astafyeva (1996) [1], carried out in the twentieth century, indicate a decrease in the level of development of motor (including strength) abilities in mentally retarded schoolchildren compared to children without intellectual disabilities. Later, the attention of researchers began to be drawn to the issues of comparing the dynamics of development of motor abilities of children with intellectual disabilities living in different climatic and geographical zones of Russia (O.A. Barabash, 2005 [2], G.I. Vysoven, 2016 [3]), and determining the sensitive periods of their development. In recent years, the study of the development of motor skills of children with disabilities has received a new vector of development due to the development and implementation of the All-Russian Physical Culture and Sports Complex GTO for the disabled, and the results of the tests have become a guide for practicing teachers, showing the direction of further work to improve the process of physical education of schoolchildren with disabilities. As is known, the relationship between motor skills and motor abilities is considered as a dialectical unity (motor abilities are manifested through certain actions, which in turn exist only in the presence of certain abilities). In this regard, attention is drawn to the difficulties that schoolchildren with intellectual disabilities encounter when passing the All-Russian Physical Culture and Sports Complex GTO pull-up test from a hang on a horizontal bar (high, low 90 cm), as evidenced by the results of pedagogical observation during the passing of the All-Russian Physical Culture and Sports Complex GTO standards by students of the

State Autonomous Educational Institution of the Amur Region "Secondary (Korolev) School No. 7 of the city of Blagoveshchensk". If some schoolchildren are still able to demonstrate push-ups in a prone position, then the vast majority of students are not able to cope with pull-ups on a horizontal bar. This obliges teachers to look for various ways to improve the process of physical education and the formation of motivation of schoolchildren using new methods and means of teaching. One of the ways to solve these problems is the use of modern and diverse sports equipment. For this purpose, a training device was developed that allows, in simplified conditions, not only to master the technique of performing pull-ups from a hang for boys and pull-ups from a hang lying down for girls, but also to effectively develop the strength abilities necessary to fulfill this standard of the VFSK GTO complex for people with intellectual disabilities.

Objective of the study was to demonstrate the efficacy of the training apparatus in the context of physical education for elementary school students with mild intellectual disabilities.

Methods and structure of the study. The following methods were used in the experiment: pedagogical testing, pedagogical observation, and the method of mathematical statistics.

The study was conducted at the State Autonomous Educational Institution of the Amur Region "Special (Correctional) Comprehensive School No. 7 of Blagoveshchensk" in the afternoon during additional physical education classes. At the beginning of the experiment, preliminary testing of boys and girls aged 8-9 (8 people each) was conducted, which showed that not a single child was able to perform the pull-up test on a high (low) bar in full (the assessment was carried out according to the method of M.F. Sautkin 2007 for boys[1] and 2008 for girls[2]).

Before the main pedagogical experiment, a control and an experimental group of 8 people each were formed. They included children whose results did not statistically significantly differ from each other. In both groups, lessons were held 3 times a week for 40 minutes based on the working program of the subject "Physical Education", which included the balanced development of all motor abilities and the acquisition of a range of motor skills in all sections of the educational program. In the main part of the lesson, both in the experimental and control groups, exercises were used for all muscle groups (back, abdomen, shoulder girdle, arms), which were performed in dynamic and static modes using the "circular" method. The selection of exercises in both groups was carried out so that the exercises in the complex were aimed at different muscle groups and in different modes: flexion and extension of the trunk in the supine position, arching from the initial prone position – "boat" with a minimum separation of the legs and trunk from the floor, holding the gymnastic stick at the top, holding the corner in the supine position with the arms at the top. The selection of these exercises was due to the inclusion of the largest number of muscles involved in the pull-up test. The last station was different:

- in the control group, pull-ups were performed on the horizontal bar (high for boys, 90 cm for girls from the floor), with the help of a teacher (or trained schoolchildren), first in a yielding mode, then in an overcoming mode;

- in the experimental group, for the safest and most interesting conduct of classes, a training device was developed and used, which was two L-shaped stands connected by crossbars. On the axle, fixed to the racks, there are two rims with spokes, connected to each other by slats of different colors and forming a drum. A disk brake and adjustment device allowing to adjust the speed of the drum.

The main task at the initial stage is to give a correct idea of the motor action "pull-up" in simplified conditions using the training device, to include in the work all the muscle groups participating in this test (first the shoulder muscles are included in the work on straight arms sorting through the bars, and then the muscles are included in the work - flexors and the latissimus dorsi). In parallel with this, tasks were given to include the muscles of the trunk, pelvis and lower extremities. The device allows to develop not only strength abilities and correct technique, but also to relieve tension and fear when doing pull-ups in children with intellectual disabilities.

[1]Patent 2339296. Rossiyskaya Federatsiya, MPK A61V 5/00 (2006.01). Sposob opredeleniya silovoy vynoslivosti verkhnikh konechnostey i plechevogo poyasa. M.F. Sautkin [ed.]. zayavitel i patentoobladatel Gosudarstvennoye obrazovatelnoye uchrezhdeniye vysshego professionalnogo obrazovaniya «Ryazanskiy gosudarstvennyy meditsinskiy universitet imeni akad. I.P. Pavlova Federalnogo agentstva po zdravookhraneniyu i sotsialnomu razvitiyu». No. 2007124056/14; 26.06.2007; opubl. 27.11.2008. Byul. No. 33. 4 p.

[2]Patent 2382602. Rossiyskaya Federatsiya, MPK A61V 5/22 (2006.01). Sposob izmereniya silovoy vynoslivosti pri podtyagivaniyakh tela v naklone. M.F. Sautkin [ed.]. zayavitel i patentoobladatel Gosudarstvennoye obrazovatelnoye uchrezhdeniye vysshego professionalnogo obrazovaniya «Ryazanskiy gosudarstvennyy meditsinskiy universitet imeni akad. I.P. Pavlova Federalnogo agentstva po zdravookhraneniyu i sotsialnomu razvitiyu». No. 2008111301/14; 24.03.2008; opubl. 27.09.2009.Byul. No. 36. 8 p.: il.

Results of the control and experimental groups during the pedagogical experiment

Parameters	Control group				Experimental group			
	Before	After	Difference	p	Before	After	Difference	p
	M±m	M±m	%		M±m	M±m	%	
Pull-ups by M.F. Sautkin (kg, m)	12,03±3,43	15,34±2,56	27,5	<0,05	11,85±4,46	22,3±5,4	88,1	<0,05
Right arm dynamometry (kg)	3,25±1,12	3,64±1,23	12	>0,05	3,55±0,97	4,72±1,12	32,9	<0,05
Left arm dynamometry (kg)	2,75±1,67	3,11±1,46	13	>0,05	2,67±1,23	3,53±1,78	32,2	<0,05
Deadlift dynamometry (kg)	15,6±3,31	17,23±3,54	10,4	>0,05	15,3±3,7	19,14±4,5	25	<0,05

Results of the study and discussion. A comparative analysis of the results of tests after the pedagogical experiment allows us to conclude the following.

Statistics showed that the students in the experimental group performed pull-ups better than the students in the control group. This was confirmed by an expert assessment of 4,7 points and 3,5 points, respectively. When evaluating the pull-up test using the method of M.F. Sautkin [11, 12], the indicators were reliable in both groups ($p<0,05$). The control group showed a result with an increase of 27,5%, but the students found it difficult to independently perform pull-ups technically correctly with the maximum result. While in the experimental group, with an increase of 88,1%, the children showed good technique for performing the exercise with the maximum number of reps.

The increase in the actual strength capabilities of the back muscles (dead-end dynamometry) in the experimental group is 14,6% higher compared to the control group ($p<0,05$). According to the results of wrist dynamometry, the experimental group showed significantly higher indicators: the right hand by 20,9% and the left hand by 19,2% compared to the control group ($p<0,05$). This is explained by the fact that the experimental group worked on a training device that allows students to perform all exercises to failure, without fear of breaking down and getting injured, and to improve the results of this test.

Conclusions. The use of the presented drum-type training device allows to develop the motor skill of performing pull-ups both on a high and on a low bar, to develop the strength abilities of students with intellectual disabilities, to relieve tension and fear when performing the strength test of the All-Russian Physical Culture and Sports Complex GTO for people with intellectual disabilities.

References

1. Astafyev N.V., Mikhalev V.I. Fizicheskoye sostoyaniye umstvenno otstalykh shkolnikov. Study guide. Omsk: SibGAFK publ., 1996. 160 p.
2. Barabash O.A. Kontrol kachestva obrazovaniya po fizicheskoy kulture v spetsialnom obrazovanii (na primere obrazovatelnykh uchrezhdeniy VII, VIII vida). Monograph. Vladivostok: DVGU publ., 2005. 196 p.
3. Vysoven G.I. Formirovaniye rekreatsionnoy kultury shkolnikov 12-13 let s legkoy umstvennoy otstalostyu na zanyatiyakh mini-voleybolom po-yaponski. PhD diss. abstract. St. Petersburg, 2016. 24 p.
4. Dmitriev A.A. Korrektsiya dvigatelnykh narusheniy u uchashchikhsya vspomogatelnykh shkol sredstvami fizicheskogo vospitaniya. Study guide. Krasnoyarsk: Krasnoyarskogo universiteta publ., 1987. 152 p.
5. Mozgovoy V.M. Formirovaniye sportivnykh dvigatelnykh navykov u umstvenno otstalykh shkolnikov 11–16 let pri obuchenii ikh gimnasticheskim uprazhneniyam. PhD diss. Moscow, 1977. 265 p.
6. Samylichev A.S. Differentsirovannyy podkhod k uchashchimsya vspomogatelnoy shkoly pri vospitanii dvigatelnykh sposobnostey na uroke fizicheskoy kultury. PhD diss. Moscow, 1984. 197 p.
7. Chernik E.S. Dvigatelnyye vozmozhnosti uchashchikhsya vspomogatelnoy shkoly. Moscow: Prosveshcheniye publ., 1992. 128 p.

Features of formation and development of student sports in China

UDC 796

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Abstract
On the large scale of China (PRC) establishment, physical education in the country has a nearly 70-years history, evolving from simple to complex, adjusting and giving a rise to various sub-disciplines [1]. This research reveals chronology of school physical education in New China through different periods, analyzes prominent impact of policy amendment, and reflects on its epoch-making course of development. By exploring the history of school sports, we gain insights into China's education system, the role of sports in nation-building, and their great influence on youth health and spirits, as well as high educational standards. Taking into consideration a thorough study of Chinese and foreign literature, we define three stages of growth: the initial phase (1949-1976), the period of reform and recovery (1977-2008), and the era of discipline development (2009-present).

Keywords: *China school physical education; education system; adolescent health; quality education.*

Introduction. The physical education of students in China has undergone a nearly 70-year transformation, reflecting the country's broader educational and societal shifts. This paper aims to provide a chronological analysis of school physical education in New China, from its inception to the present day. We explore the history of school sports to understand China's education system, the role of sports in nation-building, and their impact on youth health and spirits, as well as high educational standards. The study is structured around three growth stages, each characterized by distinct policy influences and societal needs. By reviewing Chinese and foreign literature, we aim to define the evolution of school sports and its significance in the broader context of China's educational development and national identity.

Methodology. Our research methodology is a blend of historical review and analytical techniques, aimed at providing a clear and scientific understanding of the development of student sports in China:

Historical Documentation Review: We scrutinized historical records, policy changes, and curricula to chart the evolution of school physical education.

Content Analysis: We identified key themes and trends by analyzing literature, focusing on the effects of policy, teaching method evolution, and the role of sports in education.

Comparative Analysis: We compared China's school sports development with global practices to understand its unique trajectory and international influences.

Case Studies: We examined specific instances, such as the creation of sports academies and the Beijing Olympics, to understand the real-world impact of policies and reforms.

Results. Stage I (1940s-1976): The Emergence Period

Since 1949, along with foundation of China (PRC), physical education at schools gained a paramount attention. To start with, in 1951, the Central People's Government issued the "Decision on Education System Reform," which provided new regulations on the status, duration, and coordination of various levels of schools. It marked the initial formation of a specialized teaching workforce, creating favorable conditions for the development of school physical education [2].

Due to insufficient health conditions of students at all levels of education everywhere, the Central People's Government issued an order the same year, emphasizing the improvement of students' physical health as a crucial task to ensure their successful achievement of academic goals and the cultivation of modern, robust youth [3]. Further, in 1951, a Chinese sports delegation visited the Soviet Union and, drawing from Soviet experience and China's specific circumstances, led by Yang Lie, completed elaboration, issuing, and implementation of the first national broadcast gymnastics program [4].

Secondly, in 1952, in view of the shortage of staff and insufficient quality of PE teachers, under those circumstances the first sports academy was established: the East China Physical Education Institute (later renamed Shanghai university of Sport in 2023). It was formed by merging the physical education departments and divisions of three universities: Nanjing University, Jinling Women's University, and East China Normal University [5].

Next, in 1953, the Ministry of Education decided to take a ten-year school physical education curriculum as a model. Specifically, it was emphasized that school physical education classes should be based on the principles of improving students' health, promoting their comprehensive development, and creating lively, diverse, and student-oriented education to boost their interest and achieve objectives [6].

Afterwards, in 1956, the first "Primary and Secondary School Physical Education Curriculum Outline" was published, establishing the gist and aims of school PE curriculum. Physical education was no longer solely focused on physical training, but placed a greater emphasis on cultivating comprehensive qualities.

Thus, during the Cultural Revolution from 1966 to 1976, China's PE curriculum development came to a standstill, and the physical education sector suffered severe disruptions. During this period, many physical activities and teaching contents were canceled and replaced by military courses and some labor courses, resulting in a significant setback in China's physical education [7].

In summary, after the founding of China (PRC), there was laid the framework for the development of particular sports ideology and advanced teaching methods. The evolution of policies and reforms reflected the government's shifting concerns and priorities regarding school physical education. In this way, school physical education gradually went through the stages of renaissance, with a renewed emphasis on nurturing students' physical health and comprehensive qualities. However, during the Cultural Revolution, the development of school physical education experienced a setback and disruption.

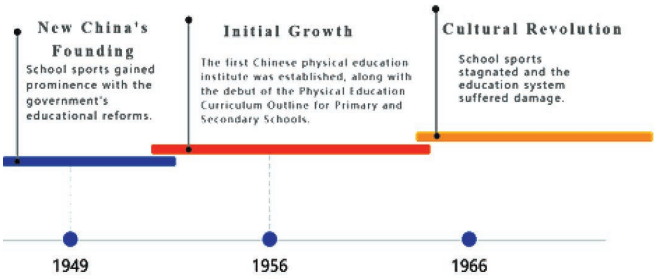

Fig. 1 Early development of Chinese sports

Stage II (1977-2008): The Period of Reform and Revival

Considering the second stage, it this marks a turning point in the development of PE in Chinese schools, spanning the decades following the initiation of economic reform and opening up. During this period, Chinese school physical education had undergone underwent significant policy changes and reforms that not only influenced the course of school PE evolvement, but also shaped the scope.

To begin with, in 1977, the National Sports Commission restored the School PE Department. Simultaneously, each province, city, county, and education department established special PE and health departments, as well as specialized PE teaching and research offices [8]. In 1978, the Third Plenary Session of the Eleventh Central Committee introduced the concept of economic reform and opening-up. Subsequently, the management structure of school physical education underwent gradual restoration and fortification. This period also witnessed the enhancement of management systems across various educational levels in the nation, ushering school PE toward standardization, institutionalization, and scientificity [9].

Secondly, in 1979, there was the introduction of the full-time ten-year system for primary and secondary school PE curriculum which marked a significant milestone, placing it on a well-ordered course. This action initiated a direction for the development and reform of PE teaching curricula [7].

Consequently, the implementation of economic reform and innovative policies presented fresh opportunities and challenges to school sports in China. During this period, China began engaging with the interna-

tional education system, gradually opening up to the world. The field of PE also underwent transformation. Thus, in 1985, the Central Committee of the Communist Party of China issued a resolution on education system reform, emphasizing that the fundamental goal of education reform was to enhance the nation's overall wellbeing. As a result, school sports under the headline of high-standard education entered a new large-scale stage.

It's worth to mention, that incorporating comprehensive studies, the assimilation of educational philosophies, and sports concepts from Western countries led to the emergence of various sports ideologies, such as "Happy Sports," "Successful Sports," "Restorative Sports," and "Lifelong Sports," were based upon the foundation of these ideas. Originated in distinct theoretical concepts, these sports activities converged to integrated improvement of students' physical and mental development. Consequently, this period significantly enriched the understanding of school sports and contributed to the diversification and open policy of school sports. In particular, school sports curriculum expanded beyond traditional gymnastics and shift basic PE programs to imply team sports like basketball, soccer, and volleyball, offering students greater choice and participation opportunities in various athletic activities.

Eventually, in 1992, official PE c for nine-year PE curriculum was constituted and issued for primary and secondary schools. Furthermore, China initiated a new round of physical education curriculum reforms in 2001, with the Ministry of Education issuing an Outline of Curriculum Reforms for Basic Education. This period also witnessed the growth of PE teaching staff in terms of both quantity and specialization, reflecting the evolving requirements of school PE in cultivating talent for 21st-century. It also demonstrated the notable achievements in primary and secondary school PE curriculum construction and teaching reforms [10].

Additionally, PE fostered interdisciplinary collaboration with various fields, extending its research beyond the domain of sports to encompass areas like psychology, biology, and sociology. Moreover research methodologies were diversified, due to incorporation of quantitative research, qualitative research, and case studies, resulted in a broader spectrum for discipline exploration [11].

Altogether, Chinese school sports induced an increasingly influential presence on the international stage. Thus, in 2001, Beijing was awarded the host city for the 2008 Summer Olympic Games. Consequently, international sports events and academic exchanges spread, leading to the integration of Chinese physical education into the global PE scale. At the same time, China actively expanded its sports culture abroad, providing a high appreciation of China by the international community.

In conclusion, within the past half of the 20th century, Chinese school sports had undergone a series of notable developmental stages. From the reestablishment of the School Sports Division by the National Sports Commission and to the introduction of the full-time ten-year primary and secondary school PE curriculum, this period had marked the renaissance and standardization of school sports. The advent of economic reform and pursuing an open policy defined a new era of school sports, determined by various educational concepts and sports policies that enriched the content and practical teaching of sports at schools. Nonetheless, certain challenges remain and require further attention and analysis.

Fig. 2 Development direction after reform and opening up

Stage III (2008s to Present): The Period of Discipline Advancement

Considering the third phase, it signifies a distinct chapter in the evolution of school PE in China. It has been determined by increased policy support and substantial investments, facilitating the rapid development of the PE discipline.

Following the 2008 Beijing Olympics, the Chinese government demonstrated a strong commitment to the headway of school PE, since series of policies and

initiatives were initiated to promote the growth of this dominating. First, in 2011, the "New Standards for Physical Education Curriculum" were declared with the objectives of enhancing physical abilities, acquiring motor skills, nurturing students' interests and enthusiasm for PE activities, and instilling the habit of persistent exercise through PE classes [12]. First of all, the Twentieth National Congress of the Party emphasized the intention to "build a modern educated and athletic country, promoting the entire development of students' physical and mental well-being" [13]. In 2022, the "Compulsory Education Physical Education and Health Curriculum Standards (2022 Edition)" reinforced the focus on "strengthening multidisciplinary integration within physical education, make use of the full potential of physical education, and encouraging student development everywhere" [14]. Consequently, school PE has evolved into a complex discipline, giving rise to emerging sub-disciplines such as sports economics, sports law, sports sociology, and more. This diversification has enriched the essence of the PE discipline, rendering it more comprehensive and adaptable to diverse academic needs [14].

In response to technological advancements and the advent of the big data era, Chinese school sports has begun integration of science, technology, and innovation. Particularly, modern technologies like virtual reality and big data analysis has been applied to enhance the efficiency of physical education and training. Grounded in a data-driven teaching philosophy, big data technology facilitated the creation of precise PE teaching models, enabling a smart teaching approach characterized by the digitized capture, visualization, quantification, transmission, and presentation of PE process [15]. Wang Xiangquan et al. [16] advocated employing blockchain as a core component of information-based teaching to reform educational organization and teaching methods, as well as charted the course for the integration of PE curriculum. Consequently, big data has promoted comprehensive teaching and intervention, making them widely availiable and feasible. Afterwards, this transformation has given rise to significant changes in the landscape of college sports services, including the emergence of virtual sports classrooms, sports flipped classrooms, sports micro-courses, sports catechism, and other innovative teaching modes and methods that are driving the reform of sports teaching services in the modern era.

For this reason, smart sports service (SSS), embodying both technological and humanistic wisdom, stands as a representative of the new frontier in sports service within the era of intelligence [17]. As the core value of college sports big data in SSS platform innovation and development becomes increasingly apparent, the continuous collection, dynamic aggregation, deep mining, and effective utilization of student data serve as crucial pillars supporting the advancement of SSS. This trend has significantly contributed to the development of sports research and training.

At the same time, international cooperation and exchange have been advanced, since scholars are engaging in international academic symposia and collaborative programs to draw insights from advanced international theories and practical experiences. For instance, in 2023, the FISU World Academic Congress was officially inaugurated in Chengdu, marking a significant educational event for FISU and a vital component of the Universiade [18]. This enhanced international collaboration together with encouraging persistent integration of Chinese school sports into the global academic ecosystem and advancing the discipline's globalization.

With regard to the speech at the National Education Conference, General Secretary Xi Jinping emphasized, "Education is a headstone for national rejuvenation and social progress, a benevolent undertaking that serves both the present and future generations, and is of decisive significance in elevating the comprehensive quality of the people, promoting the all-encompassing development of humanity, enhancing the innovation and creativity of the Chinese nation, and realizing the great rejuvenation of the Chinese nation. Education is a major national initiative and a fundamental party undertaking" [19]. In alignment with this vision, school sports have transformed towards the concept of comprehensive quality education, with Chinese peculiarities on the top. PE no longer solely focuses on athletes bringing up, but also represents the main course on cultivating students' innovation, teamwork, social responsibility, and overall development. Particularly, the Twentieth Party Congress introduced the notion of "Chinese-style modernization," defining a new stage of "Chinese-style education modernization" [20].

Nowadays, the policy of school sports in China may be distinguished by certain possibilities and challenges. The increase in number of disciplines, integration of science, technology, and innovation, as well as development of global cooperation, commitment to high standard of education, and emphasis on maintaining

PE and cultural heritage all in all provide a rich pool of resources and wide opportunities for the future PE. On the grounds that society has been evolving and the discipline advancing, Chinese school PE will progress, making a permanent contribution to the physical and mental well-being of students and advance of high-standard education. This stage of development has been designed to shape the bright future of school sports.

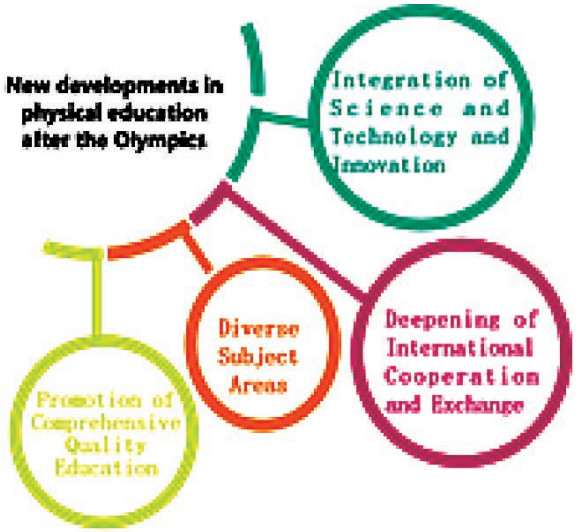

Fig. 3 The impact on physical education after the Olympic Games

Conclusion. In conclusion, within the past 70-years school sports in China has gone through an outstanding changes, moving from a "health-oriented" approach to adopting the concept of "lifelong sports." The government has issued a number of principles and strategic plans, that form an integral part of the national agenda, therefore established the firm relationship between health and education in school sports. The concept of "integrated development" has expanded further the mission of school PE, going beyond the development of physical fitness and skills of students for the benefit of society and the promotion of a healthy lifestyle. In addition, special attention is paid to improving the quality and diversity of the physical education curriculum. These developments have transformed school physical education into a key component of a well-rounded quality education, providing greater opportunities for the entire physical and mental development of young people.

As the discipline looks to the future, it must continue to support international exchanges, engage in interdisciplinary research, and maintain a strong focus on high-standards of education. These efforts are crucial to ensure that the discipline meets the needs of society, develops outstanding PE professionals, protects the well-being of the entire population, and continuously promotes the dynamism and innovation of school physical education in China.

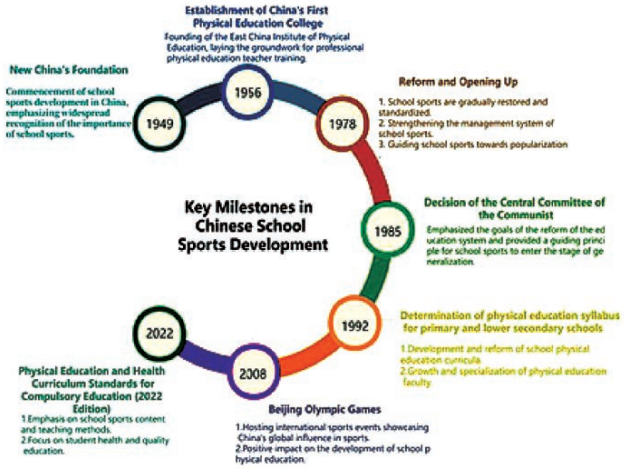

Fig. 4 The Development of Physical Education in New China from the 20th Century to the Present

References

1. Xu Yanli. "Research on the "History of Chinese School Sports" in the Construction of Physical Education Discipline". Compilation of abstracts of papers of the 12th National Sports Science Conference - Special Report (Sports History Branch). Ed.., 2022, 217-218.
2. Wang Jiayuan. Consolidate the foundation for the future, gather knowledge and teach—the 70-year reform and development history of basic education in New China [J]. Western Education Guide, 2019 (10): 4.
3. "Decision of the Government Affairs Council of the Central People's Government on improving the health status of students in schools at all levels." Jiangxi Political News. 08(1951):122-123.
4. Qian Rui. "Yang Lie: The initiator of the first national broadcast gymnastics in New China." Overview of Party History .05(2023):35-36.
5. Wang Yu. "Leading the wave of the times, never forgetting the soul of sports, the "green tile feelings" of Shanghai Institute of Sport that have remained unchanged for 70 years." Xinmin Weekly .42(2022):70-73.
6. Li Xiumei. "Review of School Physical Education Reform in the Early New China." Sports Culture Guide 1 (2002): 60-62.

7. Xie Changfa, and Xu Jin. "A historical review of physical education reform in primary and secondary schools." Bulletin of Sports Science and Technology Literature 26.10(2018):21-23+45.
8. Zhou Denghao. School Physical Education[M]. Beijing: People's Sports Publishing House, 2004: 17
9. "The Third Plenary Session of the Eleventh Central Committee opened up a new era for the development of the socialist cause" Western Times 2011-06-28,009, column.
10. Huang Shupeng, Tang Yuanchao, and Jiang Dongsheng. "70 Years of New China: The Process, Characteristics and Enlightenment of the Evolution of School Physical Education Thoughts." Sichuan Sports Science 41.06(2022):108-112+133. doi:10.13932
11. Zou Shiyan. "Implement the spirit of reform and further carry out the reform and experimental work of the physical education syllabus." Curriculum. Textbook. Teaching Methods 5 (1992): 1-3.
12. Dang Linxiu, and Zhu Meizhen. "Recommendations for Implementing the 2011 Edition of "Compulsory Education Physical Education and Health Curriculum Standards" - Based on Ten Years of Experience in Physical Education Curriculum Reform." Chinese School Physical Education .03(2013):30-32.
13. Tian Jirong, Duan Ying. Tsinghua University teachers and students heatedly discuss the Party's 20th National Congress report[N]. New Tsinghua, 2022-10-21(001).
14. Ye Yuhua, and Song Shuhua. "The value implication and breakthrough strategies of interdisciplinary teaching of physical education in primary and secondary schools from the perspective of comprehensive development". Proceedings of the First Shaanxi Sports Science Conference (1). Ed.., 2023, 506-510.
15. You Songhui, et al. "New progress and development trends in Chinese sports subject research in the big data era." Journal of Chengdu Institute of Physical Education 49.04(2023):1-8. doi:10.15942/j.jcsu.2023.04.001.
16. Wang Xiangquan, Jiang Yong, and Yi Junxi. "Application selection and architecture design of integrated blockchain technology for physical education courses." Journal of Shanghai Institute of Sport 45.9 (2021): 40-49.
17. Li Yanyan, Chen Wei, and Wu Xiangling. "Logical implication, system construction and operation guarantee of smart sports services in colleges and universities in the intelligent era." Journal of Wuhan Institute of Physical Education 55.12(2021):35-42. doi:10.15930/j.cnki.wtxb.2021.12 .006.
18. "Chengdu Universiade: Spreading the brilliance of youthful vitality and showing China's myriad aspects." China News Release (Practical Edition) .09(2023):65-68.
19. Xi Jinping: Adhere to the development path of socialist education with Chinese characteristics and cultivate socialist builders and successors with comprehensive development of morality, intelligence, physical education, and art." Ningxia Education .12(2018):4-6.
20. Feng Jianjun. "Ten Years in the New Era: Achievements in the Construction of the Socialist Pedagogy System with Chinese Characteristics." Journal of Suzhou University (Education Science Edition) 11.03(2023):1-14. doi:10.19563/j.cnki.sdjk.2023.03.001.

The educational focus of physical training in the context of cadets' social and professional development

UDC 304.44

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Abstract

Objective of the study was to support the educational focus of physical training in the context of the social and professional development of cadets.

Results and conclusions. The examination of scholarly research and educational practice in the realm of physical education within the context of higher education reveals that a variety of training programs and social engineering initiatives can serve as potent psychological and pedagogical instruments for fostering social communication abilities. These training programs are designed to enhance cadets' social communication and interaction skills within the framework of the physical education curriculum. They involve the demonstration and repetition of exercises to develop physical attributes. Additionally, they encompass a variety of search, project, and creative tasks aimed at discovering innovative approaches to increase physical activity. Furthermore, they encompass a range of situations that simulate interactions in professional settings, particularly in extreme circumstances where it is crucial to make joint decisions based on a specific level of physical fitness and personal and communicative abilities. These situations also include competitive game elements. Another method is social engineering, which involves creating future scenarios through the application of collaborative techniques.

Keywords: *a military educational institution, cadets, social skill, pedagogical means, pedagogical activity, social interaction.*

Introduction. An analysis of scientific literature shows that pedagogical activity leads to the expected result if:

- is considered in the context of a specific educational situation;
- is understood not as universal, but in combination with methods of teaching, education, socialization of a person and forms of organization of the educational process;
- involves joint activity of a teacher and a student, is designed to combine subtle and intense influences, direct and indirect impacts [1, pp. 77-79].

Thus, the means of pedagogical activity are what ensure their functioning at any stage of the formation and development of a human personality. They can be considered in a broad (study, work, any type of activity, etc.) and narrow (word, book, example, equipment, teacher's skill, his technique, didactic materials, etc.) sense of the word. Their purpose is subject support of the pedagogical process. In this context, they intersect with forms.

Objective of the study was to support the educational focus of physical training in the context of the social and professional development of cadets.

Results of the study and discussion. An analysis of scientific research and teaching practice in the field of physical education in the higher education system shows that various trainings based on the use of methods for organizing the desired activity can be a traditional psychological and pedagogical means of practicing social communication skills [3, p. 192]. Any of these trainings, which are aimed at developing people's social communication and interaction skills within the framework of the physical education process, should include:

- a specific set of actions that actualize previously existing ones, as well as demonstrating missing aspects with their multiple repetition during the demonstration of exercises to develop physical qualities;
- a range of search, project, creative tasks aimed at finding innovative methods to increase physical activity;

- a set of situations that model relationships in professional activities that can arise in extreme cases where it is necessary to make a joint decision that depends on a certain level of physical fitness, personal and communication skills;

- game competitive fragments that help simulate situations typical for the physical and social skills being developed, provide opportunities to try on various social roles.

The next means of developing the social skills necessary for cadets is social design, which is a process of modeling upcoming actions through the use of cooperation methods. Involving cadets in the process of implementing socially necessary projects leads to: developing an active social and civic position, preventing "social inaction", developing the ability to develop and defend one's own point of view, acquiring by future officers the necessary physical and professionally significant skills, as well as interpersonal interaction skills with different partners in various spheres of everyday and combat activities [2, p. 44].

An analysis of their works by a number of authors allows us to clarify and expand the range of pedagogical tools used.

Yu.N. Lysenko examines the process of forming and improving interpersonal interaction skills in conjunction with the development of experience in students of military universities in constructive problem solving that may arise in a difficult life situation. In this case, the necessary skills of joint activity based on mutually beneficial cooperation are formed, as well as the construction and modeling of certain behavior strategies in the educational, service, organizational and leisure activities of students [6, p. 99].

E.A. Igonina and other researchers in the issues of organizing interpersonal and multicultural interaction of students of a military educational organization promote and prove the effectiveness of such methods, means and concepts of forming special skills of socio-cultural interaction, which are based on the idea of "cross-culturality". At the same time, the authors consider the presence and full use of the educational space of the educational organization to be the main condition for the success of these skills [5, p. 15].

Consequently, the formation and further improvement of any skill and, ultimately, interpersonal social interaction, provides for the presence of the following order of stages:

1) demonstration;
2) familiarization with the actions;
3) automation of actions;
4) extrapolation of the action to other conditions.

Conclusions. To summarize the above, we will note that the development of the necessary behavioral and social skills in cadets of a higher military educational organization can be carried out in the process of educational, service, educational and research activities within the framework of physical education at the university. However, the analysis showed a lack of a methodological base for training officer personnel aimed at solving and practicing socially oriented professional tasks in modern conditions. This fact proves the need to develop more effective and pedagogically appropriate means, as well as methods for improving the skills of interpersonal social interaction in cadets in the process of their physical education at a military university, and, accordingly, additional study of individual aspects of optimizing the pedagogical process itself.

References

1. Baranova V.A., Bocharova V.G., Plotkin M.M., Rozhkov M.I. Sotsialnoye vospitaniye kak teoreticheskiy kontsept i atribut sotsialno-pedagogicheskoy praktiki. Monograph. Moscow: Sovremennoye obrazovaniye publ., 2017. 195 p.
2. Burikov A.V. Teoreticheskiye aspekty organizatsii fizicheskoy podgotovki voyennosluzhashchikh. Obzor pedagogicheskikh issledovaniy. 2020. Vol. 2. No. 4. pp. 43-48.
3. Vasin V.N., Burikov A.V., Gorokhov A.V. Rezultaty pedagogicheskogo eksperimenta po sovershenstvovaniyu urovnya fizicheskoy podgotovlennosti voyennosluzhashchikh. Sovremennyy uchenyy. 2020. No. 2. pp. 191-195.
4. Grishinov V.P., Skripachev S.A., Yakunin N.I. Mezhlichnostnyye otnosheniya kursantov voyenno-uchebnogo zavedeniya. Uchenyye zapiski universiteta im. P.F. Lesgafta. 2017. No. 12 (154). pp. 67-71.
5. Igonin E.A., Ogorodnik S.I. Psikhologo-pedagogicheskoye obespecheniye optimizatsii mezhlichnostnogo vzaimodeystviya v studencheskoy gruppe. Elektronnyy nauchno-prakticheskiy zhurnal «Kultura i obrazovaniye». 2015. No. 2 (18). 15 p.
6. Lysenko Yu.N. Optimizatsiya psikhologicheskikh sostoyaniy kursantov pogranichnogo instituta FSB Rossii i yeye vliyaniye na produktivnost uchebno-pedagogicheskogo vzaimodeystviya. Teoriya i praktika psikhologo-sotsialnoy raboty v sovremennom obshchestve. Proceedings of the IV International correspondence scientific-practical conference, March 25, 2016. Arzamas. 2016. pp. 97-100.

Assessing the physical condition of the younger generation through the implementation of GTO tests

UDC 613.7

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Abstract

Objective of the study was to according to statistical data, we will examine the physical condition of the youth population in Russia aged between 6 and 17 years, using the results of the GTO complex tests for the year 2023.

Methods and structure of the study. The following approaches were employed: sociological (questionnaires, content analysis), examination and analysis of the federal statistical data from the regions of Russia, observation, comparison, and mathematical and statistical processing of the findings. The research was conducted at the Federal State Budgetary Institution «Federal Scientific Center for Physical Culture and Sports» and the scientific and methodological center for the implementation of the All-Russian Physical Culture and Sports Complex «Ready for Labor and Defense» at Smolensk State University of Sports. As part of their scientific and methodological support for the industry, these institutions annually monitor the implementation of the All-Russian Physical Culture and Sports Complex «Ready for Labor and Defense» across the Russian Federation.

Results and conclusions. The assessment of the physical condition of the Russian population aged 6 to 17 revealed the prevalence of certain tests among both male and female participants. However, the issue of incorporating less demanding tests into the TRP program warrants further investigation. This will enable us to make informed decisions regarding the removal of these tests from the testing regimen or the implementation of measures to promote these types of tests or revise their standards.

Keywords: *physical fitness, 6-17 years old, GTO complex, distinction badge, testing, trials, stages.*

Introduction. The Federal Law of 04.12.2007 No. 329-FZ “On Physical Culture and Sports in the Russian Federation” establishes the concept of the “GTO complex as a program and regulatory basis for the system of physical education of the population [1]. In turn, the normative and testing part of the GTO complex provides for state requirements for the level of physical fitness of the population based on the implementation of test standards (tests) and recommendations for weekly physical activity, and in the proposed organizational forms, preparation for testing is carried out in the established parameters for the development of physical qualities. Annual monitoring of the level of physical fitness of the population is carried out for the purpose of a comprehensive assessment of the effectiveness of the current system of physical education and the implementation of state policy in the field of physical culture and mass sports1 [1-3].

Over the ten-year period of implementation and realization of the GTO complex, the Ministry of Sports of the Russian Federation, together with interested federal executive bodies, has developed and put into effect a regulatory framework governing all areas of organization and testing of the population according to the standards of tests of the GTO complex. At the same time, in accordance with paragraph 8 of the Regulations on the GTO complex, every 4 years there should be an improvement of the complex in the context of the system of standard assessments of physical fitness for all age groups of the population of the Russian Federation. A systematized and generalized set of results of the

[1] Resolution of the Government of the Russian Federation of June 11, 2014 No. 540 “On approval of the Regulation on the All-Russian physical culture and sports complex “Ready for Labor and Defense” (GTO). Available at: https://base.garant.ru/70675222/ (date of access: 10.09.2024).

Number of participants in monitoring physical fitness from I to VI stages of the GTO complex (6-17 years old)

Steps/age	Floor				Total number of people	%
	Male, human	%	Female, human	%		
I (6-7 лет)	67125	48,63	70902	51,37	138027	19,58
II (8-9 лет)	61616	51,88	57161	48,12	118777	16,85
III (10-11 years)	55191	53,28	48397	46,72	103588	14,69
IV (12-13 years)	50118	55,46	40246	44,54	90364	12,82
V (14-15 years)	65437	58,64	46146	41,36	111583	15,83
VI (16-17 years)	80452	56,42	62150	43,58	142602	20,23
Total	379939	54,05	325002	45,95	704941	100

GTO complex implementation for 2017-2022, an analysis of analytical material on the level of physical fitness of the population from 6 to 70 years and older based on the GTO AIS downloads, the practice of implementing GTO events, expert opinions of specialists, formed the basis for scientifically substantiated proposals for improving the state requirements of the All-Russian Physical Culture and Sports Complex «Ready for Labor and Defense» in the Russian Federation for the period 2023-2026 1 2[5, 6].

Thus, the range of the age level for children and adolescents aged 6 to 17 years was determined to be 2 years, in accordance with age development, and for the adult population – every 5 years (in order to determine the dynamics of physical fitness indicators, the level of development of physical qualities, the effectiveness of physical education and sports). At the same time, children aged 6-7 years were separately included in the 1st stage of the GTO complex, with the tests themselves being brought into line with the actual program for training preschoolers in preschool educational institutions and their potential physical capabilities to successfully cope with the standards of the proposed tests.

Objective of the study was to according to statistical data, we will examine the physical condition of the youth population in Russia aged between 6 and 17 years, using the results of the GTO complex tests for the year 2023.

Methods and structure of the study. The following methods were used: sociological (questionnaires, content analysis), study and analysis of federal statistical reporting of the regions of the Russian Federation, observations, comparisons, mathematical and statistical processing of the obtained results. The studies were conducted at the Federal Scientific Center for Physical Culture and Sports and the Scientific and Methodological Center for the Implementation of the All-Russian Physical Culture and Sports Complex Ready for Labor and Defense of the Smolensk State University of Sports, which, as part of the scientific and methodological support of the industry, have been annually monitoring the implementation of the All-Russian Physical Culture and Sports Complex GTO in the Russian Federation since 2017.

Results of the study and discussion. As of 01.01.2024, the total number of registered participants in the GTO complex in the country was 22.16 million people, of which 18.3 million people or 82.6% of the total number of registered participants are children and young people. Monitoring the physical fitness of the population of the Russian Federation from 6 to 17 years old was carried out on the basis of statistical reporting 2-GTO and information provided by the Federal Operator based on the results of the GTO complex tests for 20233 [7] (see table, figure).

The analysis of the results shows that the highest activity in participating in the tests was shown by representatives of the I and VI stages – 19,58% and 20,23%, respectively, and the lowest by participants of the IV stage (12,82%). Monitoring the num-

[1] Resolution of the Government of the Russian Federation of 17.01.2023 No. 33 "On Amending the Regulation on the All-Russian Physical Culture and Sports Complex "Ready for Labor and Defense" (GTO)". Available at: http://publication.pravo.gov.ru/Document/View/0001202301180019.

[2] Order of the Ministry of Sports of the Russian Federation dated 22.02.2023 No. 117 "On approval of state requirements of the All-Russian physical culture and sports complex "Ready for Labor and Defense" (GTO)". Available at: http://publication.pravo.gov.ru/Document/View/0001202303290003 (date of access: 08.09.2024).

[3] Federalnoye statisticheskoye nablyudeniye po forme № 2-GTO «Svedeniya o realizatsii Vserossiyskogo fizkulturno-sportivnogo kompleksa «Gotov k trudu i oborone (GTO)» za 2023 g. Available at: https://minsport.gov.ru/sport/physical-culture/41/27653/ (date of access: 08.09.2024).

ber of participants in the GTO complex movement revealed that the largest number among males was recorded in the V stage, and females in the I stage (table). Children aged 6-7 years (I stage) and 16-17 years (VI stage) coped best with the state requirements of the updated GTO complex in 2023 for the gold badge of distinction, respectively, 47,4% and 53,0%. In the remaining age stages, from 30 to 37% of participants meet the standards for the gold badge of distinction. It was found that the silver badge of distinction in 2023 was received by 21,4 to 37,15% of participants aged 6 to 17 years, and the standards for achieving the bronze badge of distinction were feasible for 22,7 to 34,0% of the country's young population (see figure). Based on the data obtained, it was found that at the age of 6 to 7 years (stage I), the highest percentage of meeting the standards for the gold badge is noted in such types of tests as «Skiing» - 97,82% for boys and 98,06% for girls, and the lowest in the test «Forward bend from a standing position on a gymnastic bench» – 88,50% for boys and 91,96% for girls. In tests of the participants' choice, the highest percentage of fulfillment of the standard for a gold badge of distinction is recorded in the «Shuttle Run 3x10 m» test (96,93%), and low participation activity is observed in a test such as «Swimming» (72,77%).

Percentage ratio (I-VI level) of the young population aged 6-17 who completed the GTO complex standards for distinction badges in 2023

Among representatives of the II level (8-9 years old), the most popular tests for performing mandatory standards for the gold badge were those related to the demonstration of strength abilities. For boys, these were «Pull-ups from a hanging position on a high bar» (93,19%), and for girls – «Pull-ups from a hanging position lying on a low bar 90 cm» (92,18%). Boys and girls showed little interest in tests that assess the quality of endurance – «Mixed movement for 1000 m» (86,54% and 33,26%, respectively). As for the III age group (10-11 years old), mandatory tests that do not have an alternative choice, such as «Running 30 m» and «Forward bend from a standing position on a gymnastic bench», showed high popularity among both boys and girls. The «2 km Cross Country Run» was in low demand – only 2,29% for boys and 2,32% for girls, as well as «50 m Swimming» (8,48% and 8,42%, respectively). The highest percentage of mandatory standards for the «gold badge» is noted in the endurance test («1 km Skiing» - 94,86%), and the lowest percentage is for speed abilities («30 m Run» - 86,42%). In the IV age group (12-13 years old), the most active participation is noted in such types of optional tests as «3x10 m Shuttle Run» and «Standing Long Jump with Two Legs Push Off» - they are chosen by 81,43% and 63,48% of boys, as well as 80,52% and 63,30% of girls, respectively. The least popular among the participants of this level were «2 km skiing» (1,45%) among boys and (1,47%) among girls, as well as «A hiking trip with a test of hiking skills of at least 5 km in length» (1,13% and 0,92%, respectively). In the next – V age group (14-15 years), among the presented tests of this level, girls and boys showed low interest in the tests «3 km skiing» (1,63% of boys and 1,93% of girls), «Self-defense without weapons» (0,46% of boys and 0,33% of girls) and «A hiking trip with a test of hiking skills of at least 10 km in length» (1,28% and 1,33%, respectively). The highest percentage of the required standards for the «gold badge» among young men is observed in tests related to the demonstration of strength – «Pull-ups from a hanging position on a low bar 90 cm» (95,16%), and the lowest percentage is revealed in the alternative endurance test – «Running 2000 m» (90,88%). Among girls, the most popular type of required standards for the «gold badge» was «Skiing 3 km» (97,08%), and the lowest percentage is shown when performing the test «Running 30 m» (90,88%). Among the tests of choice in the VI age group (16-17 years old), the most popular was «Long jump from a place with a push with two legs», it is chosen by 62,24% of young men and 58,03% of girls. Among the optional tests, the least popular were the performance of such applied skills as «Self-defense without weapons» (0,53% of boys and 0,37% of girls) and «Hiking trip with a test of tourist skills of at least 10 km» (2,93% and 2,98%, respectively). The highest percentage of the mandatory standards for the "gold badge" among boys is noted in the tests «5 km skiing» (97,73%) and «Pull-ups from a hang on a high bar» (97,13%), and school graduates showed little interest in completing the test «3000 m running» (94,80%). Among girls, when performing the mandatory standards for the «gold badge», the most popular is «3 km skiing» (98,10%), and the least interest is in such tests as «60 m running» (95,70%).

Conclusions. Modernization of the physical education and sports work system builds uniform requirements and approaches to the interaction and integration of state programs for physical education of the younger generation of the Russian Federation in order to create effective mechanisms for attracting them to regular physical education and sports, building a monitoring system that tracks the level of physical fitness and health of children, adolescents and young people. Determination of the qualitative indicators of the fulfillment of the standards of the All-Russian Physical Culture and Sports Complex GTO tests for 2023 by students from I to VI levels gives an idea of the tests that are performed by the overwhelming majority of male and female subjects. At the same time, the problem of including tests with low demand in the GTO complex requires further study, which will allow making decisions on both excluding these tests from the test set and implementing a number of methodological and organizational measures aimed at popularizing these types of tests or revising their standard indicators.

References

1. Bobkova E.N., Vinogradova L.V., Zyurin E.A, Petruk E.N. VFSK GTO: sostoyaniye i perspektivy razvitiya. Teoriya i praktika fizicheskoy kultury. 2023. No. 4. pp. 110-112.
2. Zyurin E.A., Petruk E.N., Bobkova E.N. Otsenka fizicheskikh kachestv naseleniya, vypolnivshego ispytaniya kompleksa GTO. Teoriya i praktika fizicheskoy kultury. 2020. No. 10. pp. 3-5.
3. Bobkova E.N., Zyurin E.A., Kireeva A.V., Vrublevskiy E.P. Osobennosti realizatsii Vserossiyskogo fizkulturno-sportivnogo kompleksa GTO na regionalnom urovne. Teoriya i praktika fizicheskoy kultury. 2024. No. 6. pp. 52-54.

The evolution of popular sports at the local level in the perspectives and evaluations of contemporary students

UDC 316.4.063

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Abstract

Objective of the study was to investigation into the reasons for the lack of engagement in various forms of organized sports among students at universities in Volgograd.

Methods and structure of the study. The sociological study was carried out using the method of semi-structured interviews with students from Volgograd universities, who are the most engaged members of the youth population. The sample included 580 individuals.

Results and conclusions. The findings of the research highlighted one of the primary causes for the lack of student participation in mass sports, namely the absence of a consistent habit of physical activity among contemporary youth, which is primarily established during childhood. The realization of the importance of maintaining a healthy lifestyle prompts contemporary students to actively engage in sports independently. Nevertheless, the aspiration to be fit and healthy does not always effectively counteract issues such as a lack of experience in sports, a superficial approach to physical education classes in educational institutions, a limited sports infrastructure, and the absence of a comprehensive government strategy for physical education and sports.

Keywords: *: body shaping, mass sports, physical education of students, healthy lifestyle.*

Introduction. The relevance of studying the phenomenon of mass sports of institutions that allow developing mass sports, the attitude of young people towards it is undeniable, as it includes several important points. At the level of the population of the regions, mass sports contribute to strengthening people's health, forming physical and mental stability, increasing the activity of young people and their self-realization. At the country level, the development of mass sports contributes to strengthening human capital, creating a potential base for high-performance sports, since it is from mass sports that athletes move to the sport of records and victories at the all-Russian and international levels. In general, youth involvement in mass sports helps to reduce the number and reduce the forms of manifestation of deviant and delinquent behavior, contributes to more successful social adaptation. A number of scientists have studied the problems of developing mass sports and its importance. The influence of sports on people's health and the health of the nation through the development of sports complexes as a prerequisite for the development of sports and solving these issues is studied by E.G. Limanskaya, Yu.D. Ovchinnikov and A.I. Velichko. The global problem – the competitiveness of the nation – is tried to be covered in their work by I.I. Kosyreva, G.K. Shirikova, G.T. Rozhko. Development of mass sports as a way of developing human health potential is considered by G.B. Glazkova, E.Yu. Bogacheva, V.A. Golovina. Some authors believe that mass sports are high-achievement sports (E.A. Gavrilova).

Types of student sports in the forms of mass sports and high-achievement sports, the difference in the goals and objectives of these sports are analyzed by O.Yu. Brovashova, A.N. Korban, I.G. Klepikov. A sepa-

rate area of analysis of mass sports is student mass sports, which is part of high-achievement sports, although it has other goals (A.R. Zainullin). Problems and prospects for the development of mass sports in the university are considered by E.V. Nogina. And this is another area of study of student mass sports. Mass sports and high-performance sports are considered in some works as socio-cultural phenomena that allow one to penetrate into the essence of the value bases of these sports and to highlight the features of mass sports (I.E. Ponomarev, L.Yu. Strieva, S.B. Olonets). This approach is the closest to our idea: to study the phenomenon of student mass sports based on the attitude of students towards it and their assessment of their capabilities and the potential of mass sports.

Objective of the study was to investigation into the reasons for the lack of engagement in various forms of organized sports among students at universities in Volgograd.

Methods and structure of the study. The research methodology included both objective (sports infrastructure, activities of social institutions) and subjective conditions for the development of mass sports (ideas, assessments and motives of students). A semi-standardized interview was chosen as the research method. The number of respondents was 580. Students from three universities in Volgograd took part in the experiment: VolSU, VolgSTU, VolSMU. 210 students from Volgograd State University, 200 students from Volgograd State Technical University and 70 students studying at Volgograd State Medical University.

Results of the study and discussion. The students' attitude to mass sports was revealed through an assessment of its importance for young people. In the questionnaire, we proposed a seven-point scale, where 1 is the lowest point, and 7 is the highest. According to the survey results, the average point of importance of mass sports is 6,3, which indicates a high level of assessment. This point demonstrates students' understanding of the importance of sports. What are the basic motives for sports among modern students?

The first two motives are expressed almost equally by students. For a quarter of respondents, it is important to both improve their body structure (25,6%) and lead a healthy lifestyle (24,0%). Interestingly, body shaping is a basic motive for both girls and boys. The third most important motive is the steady practice of doing a certain sport (18,9%), that is, a habit that comes from childhood. It is worth noting that this motive was indicated not only by students with sports experience (from 5 to 10 years), but also by young people who do not have this experience. Next come motives associated with the desire for physical activity, overcoming oneself (9,5% each) and following fashion (6,8%). Thus, students understand the importance of sports and outlined a range of motives for starting classes, but the question remains, what prevents modern Russian regional students from doing sports regularly? It is worth noting that of all respondents, only 52% of students are involved in mass sports at the time of the survey. The study revealed the following reasons. Firstly, the shortcomings of the sports infrastructure (25,0%), criticism is directed at the equipment of not only educational institutions (schools, colleges, universities), but also regional sports schools. Here we are talking about the lack of sports organizations as such, namely those that are economically accessible to unemployed youth. Secondly, the lack of a formed culture of health and a healthy lifestyle (17,9%), that is, the same habit of playing sports since childhood. An important reason is also the insufficiently effective state policy regarding physical education and sports (14,3%). Students note the irregular and often formal nature of the sports events held, as well as the focus of sports schools on results, rather than mass involvement. In the second part of the questionnaire, we asked respondents to build a hierarchical pyramid of social institutions according to the degree of influence on a person regarding the formation of a positive attitude towards sports and the habit of engaging in physical activity. According to the study, the family is at the top of the pyramid, followed by sports organizations and comprehensive schools. The media and the state influence young people in some way. However, according to respondents, the influence of universities, technical schools and preschool institutions is not effective in the process of forming young people's aspirations to engage in sports.

Conclusions. The results of the study showed that higher education institutions do not pay enough attention to the physical development of students as participants in mass sports. This is primarily due to the general tendency of social institutions to focus on sports achievements. This is the focus of the infrastructure, the approach of coaches, and funding from the state and business. At the same time, the general physical fitness of young people and their health remain out-

side the attention of social institutions. There is a paradox in the attitude of students to mass sports. On the one hand, the importance of sports is recognized by most respondents, there are motives for doing it, on the other hand, they are not relevant and significant enough to overcome financial, social and psychological barriers.

References

1. Brovashova O.Yu., Korban A.N., Klepikov I.G. Studencheskiy massovyy sport i sport vysshikh dostizheniy. Nauka-2020. No. 2 (38). pp. 45-49.
2. Gavrilova E.A. Massovyy sport vysshikh dostizheniy kak neotyemlemyye komponenty fizicheskoy kultury. Voprosy ekspertizy i kachestva meditsinskoy pomoshchi. 2023. No. 9. pp. 22- 24.
3. Glazkova G.B., Bogacheva E.Yu., Golovina V.A., Kovalev S.V. Analiz massovogo sporta v Belgorodskoy oblasti kak primer razvitiya chelovecheskogo potentsiala. Zdorovye – osnova chelovecheskogo potentsiala: problemy i puti ikh resheniya. 2022. Vol. 17. No. 4. pp. 1652-1659.
4. Zaynullin A.R. Studencheskiy sport, massovyy sport i sport vysshikh dostizheniy. Voprosy pedagogiki. 2021. No. 4-2. pp. 89-91.
5. Kosyreva I.I., Sharikova G.K., Rozhko G.T. Konkurentosposobnost natsii cherez massovoye zanyatiye fizicheskoy kulturoy i sportom. Nauchnyy vzglyad v budushcheye. 2019. Vol. 2. No. 12. pp. 36-41.
6. Limanskaya E.G., Ovchinnikov Yu.D., Velichko A.I. Razvitiye sportkompleksov s ispolzovaniyem informatsii o vliyanii sporta na zdorovye lyudey i rost zdorovoy natsii. The Scientific Heritage. 2021. No. 79-3 (79). pp. 33-38.
7. Nogina E.V. Problemy i perspektivy razvitiya massovogo studencheskogo sporta v vuze. Innovatsii. Nauka. Obrazovaniye. 2021. Vol. 1. No. 44. pp. 30-35.
8. Ponomarev I.E., Strieva L.D., Olonets S.B. Massovyy sport i sport vysshikh dostizheniy kak sovremennyy sotsiokulturnyy fenomen. Gosudarstvennoye i munitsipalnoye upravleniye. Uchenyye zapiski. 2019. No. 1. pp. 236-240.

The organizational and pedagogical aspects of the school and municipal stages of the All-Russian Olympiad for schoolchildren in the field of Physical Education

UDC 796.011.3

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Abstract

Objective of the study was to assessment of the achievements of students in grades 7-11 at Izhevsk schools and municipal levels in the All-Russian Olympiad in Physical Education.

Methods and structure of the study. To assess the fairness of evaluating students' performance in theoretical, methodological, and practical tests at the school level and to validate these results at the municipal stage of the Olympiad, a survey was conducted among physical education teachers in Izhevsk.

Research results and conclusions. According to the findings of the survey, the primary challenges in assessing, organizing, and executing the school and municipal stages of the physical education Olympiad have been identified. The respondents have proposed the following suggestions: to engage gymnastics judges; to thoroughly analyze students' errors; to evaluate students' performances impartially; to broadcast the practical part of the Olympiad online; to exempt teachers from teaching on the day of the Olympiad; to extend the preparation time for the practical stage; to conduct theoretical and methodological tests online or in a single school within the district; to designate a specific date for the Olympiad; to adhere to the schedule for the tests.

Keywords: *school Olympiad, school and municipal stages, theoretical and methodological and practical tests, physical education.*

Introduction. The All-Russian School Olympiad (hereinafter referred to as ARSO) is one of the largest intellectual competitions in the Russian Federation, covering all subjects and areas of general education. The significance of the Olympiad in the formation of the national intellectual elite is increasing every year. It should also be noted that in terms of its scale, the VsOSh has virtually no foreign analogues and can rightfully be considered a national treasure. At the current stage of development of the domestic education system, the development of new organizational and methodological forms is of particular importance, in connection with which the need for familiarization with the accumulated experience in the field of physical education is increasing. Such forms should contribute to the improvement of the personal qualities of schoolchildren, attracting them to active independent activities aimed at improving individual qualities and abilities [1, 2, 3]. The search for new forms of work is also taking place in the field of physical education. This is consistent with the requirements of the federal state educational standard for comprehensive schools. The importance of this work is obvious, first of all, due to the fact that none of the disciplines included in the basic curriculum has undergone such a significant reform and update in its subject content and focus as is happening with the subject "Physical Education" [6].

The discipline "Physical Education" was first included in the list of subjects for which the All-Russian School Olympiad is held in the 1999-2000 academic year. In accordance with the order of the Ministry of Education and Science of the Russian Federation, the

winners and prize-winners of the All-Russian Olympiad, identified during the final stage, receive a certificate and preferential right to enroll in all higher educational institutions of the physical education profile of the Russian Federation [2, 6].

The first All-Russian Physical Education Olympiad was held in Moscow in 2000, but then schoolchildren from the Udmurt Republic did not participate. In the 2001-2002 academic year, In the year, Udmurtia has its own Republican Olympiad for schoolchildren in physical education, and since that time, schoolchildren of the Republic have been taking part in the final of the All-Russian Olympiad every year, showing excellent results: over the past twenty years, the team of the Udmurt Republic has been the leader among the regions of the Russian Federation based on the results of the performance at the final stage of the All-Russian Olympiad.

Based on the results of the Olympiad, a "Round Table" is held with representatives of the districts and cities of the Udmurt Republic, where an exchange of experience in holding school Olympiads takes place, proposals and comments on the organization of the Olympiad are made. The chairman of the jury voices the main directions for the development of the Olympiad movement in the republic and Russia and comes up with proposals and recommendations to the Ministry of Education and Science of the Udmurt Republic.

The structure and content of the Olympiad programs are complex tests, which are theoretical and practical sections. The winners are those students who harmoniously combine a high level of physical development with the depth of theoretical knowledge in the educational field of "Physical Education". According to the recommendations of the Central Subject-Methodological Commission, theoretical-methodological and practical tests are becoming more complex every year [4, 5].

Objective of the study was to assessment of the achievements of students in grades 7-11 at Izhevsk schools and municipal levels in the All-Russian Olympiad in Physical Education.

Methods and structure of the study. To assess the fairness of evaluating students' performance in theoretical, methodological, and practical tests at the school level and to validate these results at the municipal stage of the Olympiad, a survey was conducted among physical education teachers in Izhevsk.

Results of the study and discussion. The survey involved 33 respondents, more than half of whom (58%) answered that the results of theoretical and methodological tests at the school stage were confirmed at the municipal stage; some respondents (24%) gave a negative answer; while 18% did not answer this question (Figure 1).

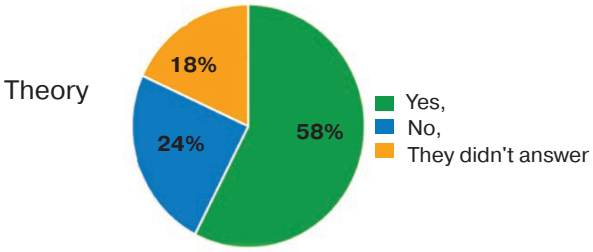

Figure 1. Results of the survey of respondents on theoretical and methodological tests of students at the school and municipal stages of the Olympiad

As for practical tests, the survey results are approximately the same as the previous ones. For example, in practical tests in the "Gymnastics" section, 67% of respondents answered that their students confirmed their performance results at the municipal stage; 15% that their students did not confirm their results, and 18% found it difficult to answer (Figure 2).

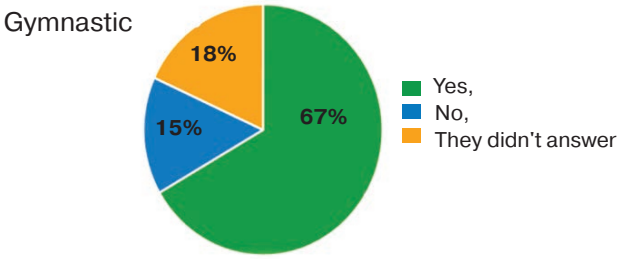

Figure 2. Results of the survey of respondents on the practical test of students at the school and municipal stages of the Olympiad (section "Gymnastics")

Since such a section as gymnastics is one of the complex types of practical tests, special training of students and members of the jury of the school stage is required. The school stage of the Olympiad is assessed by physical education teachers who do not have the specifics of judging gymnastics. Physical education teachers do not always see errors in performing a gymnastics combination that gymnastics judges can notice. That is why the results at the municipal and school stages do not always match. According to the results of a survey of respondents in practical tests in the "Track and Field" section, 79% of students confirmed their performance results at the municipal stage; 21% of respondents did not analyze the results of the students' performances (Figure 3).

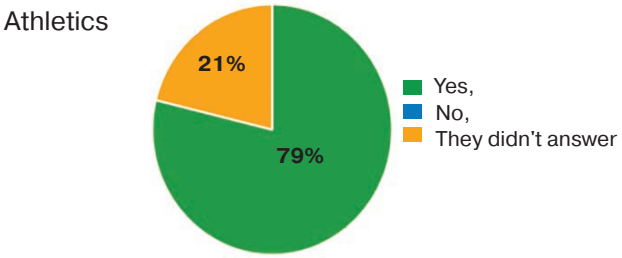

Figure 3. Results of the survey of respondents on the practical test of students at the school and municipal stages of the Olympiad (section "Athletics")

That is, judging by the teachers' surveys, schoolchildren in most cases confirm their results at the municipal stage of the All-Russian Olympiad of Schoolchildren in the subject "Physical Education". However, according to the data presented in Figure 4, it can be assumed that, based on the results of the students' performance at the school stage of the All-Russian Olympiad of Schoolchildren in the subject "Physical Education", physical education teachers inflate the grades so that the students pass to the municipal stage.

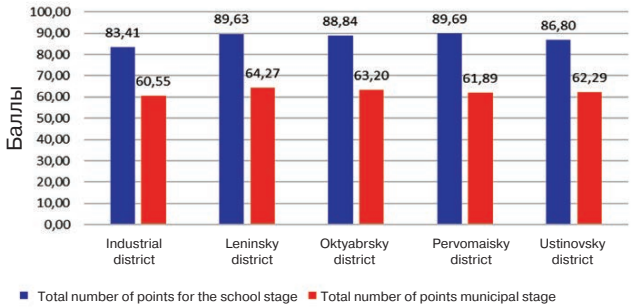

Figure 4. Comparative results of performances of students of Izhevsk at the school and municipal stages of the Olympiad in the subject "Physical Education"

We understand the motivation of the school stage jury to increase the number of their own representatives at the municipal stage of the Olympiad, but this approach contradicts the tasks facing the general education system. The number of participants in the municipal stage is limited, so a situation is possible when a student with an objectively high score takes the place of a more prepared participant. In this case, the chance of repeating a high result will be obviously lower, which will negatively affect the overall result of the performance at the municipal and regional stages of the Olympiad.

Conclusions. The results and accumulated experience of holding the Olympiad for schoolchildren in the subject "Physical Education" in the Udmurt Republic allow us to talk about the advisability of its implementation in the practice of the educational process of modern schoolchildren, as a powerful stimulating factor for involving them in regular independent physical exercise classes, striving for a healthy lifestyle. Based on the results of the survey, the main difficulties in judging, organizing and holding the school and municipal stages of the Olympiad in Physical Education were identified. The respondents gave the following recommendations: invite gymnastics judges; conduct a qualified analysis of students' mistakes; evaluate students' performances objectively; conduct online broadcasts of the practical part of the Olympiad; exempt the teacher from teaching lessons on the day of the Olympiad; increase the preparation time for the practical stage; conduct theoretical and methodological tests online or in one school in the district; determine a separate day for the Olympiad; adhere to the test schedule.

References

1. Ozdorovitelnaya fizicheskaya kultura. Study guide. N.N. Chesnokov [ed.]. Moscow, 2021. 119 p.
2. Chesnokov N.N., Balashova V.F. Finalnyy etap XXIII Vserossiyskoy olimpiady shkolnikov po predmetu «Fizicheskaya kultura» (itogi). Fizicheskaya kultura v shkole. 2022. No. 7. pp. 12-21.
3. Chesnokov N.N., Vetoshkina E.A. Regionalnyy etap Vserossiyskoy olimpiady shkolnikov po uchebnomu predmetu «Fizicheskaya kultura» v 2019-2020 uchebnom godu. Obshchiye itogi i prakticheskiye ispytaniya. Fizicheskaya kultura v shkole. 2021. No. 2. pp. 41-47.
4. Chesnokov N.N., Vetoshkina E.A., Morozov A.P. Prakticheskiye ispytaniya na zaklyuchitelnom etape vserossiyskoy olimpiady shkolnikov po uchebnomu predmetu «Fizicheskaya kultura» v 2020-2021 uchebnom godu. Fizicheskaya kultura v shkole. 2022. No. 2. pp. 44-47.
5. Chesnokov N.N., Mikhalina G.M. Soderzhaniye programm razdela «Gimnastika» regionalnogo i zaklyuchitelnogo etapov Vserossiyskoy olimpiady shkolnikov po predmetu «Fizicheskaya kultura». Moscow: Fizicheskaya kultura publ., 2019. 128 p.
6. Chesnokov N.N., Morozov A.P. Podgotovka k etapam vserossiyskoy olimpiady shkolnikov po uchebnomu predmetu «Fizicheskaya kultura». Fizicheskaya kultura v shkole. 2021. No. 6. pp. 46-49.

Social effects of the implementation of the management model for the development of the Special Olympic movement at the regional level

UDC 796

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Abstract

The purpose of the study. To identify the effectiveness of management of the development of regional branches of Special Olympics Russia on the basis of analyzing the results of the project "Inclusive Sport for All".

Methodology and organization of the study. We analyzed the results of the Inclusive Sport for All program, which is being implemented in pilot mode in 15 regions of Russia. The program is aimed at promoting social inclusiveness through sports events that simultaneously involve healthy children and young people (partners) and children with intellectual disabilities (athletes). The research included a survey of the main social customer of the project - parents (743 respondents) and guardians of athletes (100 respondents), coaches and staff of institutions for children with mental disabilities (696 respondents).

The results of the study and conclusions. The implementation of the Special Olympics development management model at the regional level has a significant impact on the social sphere, contributing to the formation of an inclusive society, strengthening social justice and improving the quality of life of people with intellectual disabilities. Sport first appeared in the lives of 41% of children together with the project "Inclusive Sport for All", implemented by Special Olympics Russia with the support of the Vladimir Potanin Charitable Foundation. One of the key social effects is a change in the public perception of disability. By actively promoting the values of the Special Olympics Movement, a education of acceptance and respect for people with developmental disabilities is formed in society, which helps to reduce stigma and discrimination.

Keywords: *Inclusive sport, Special Olympics, social effects, intellectual disabilities, regional model.*

Introduction. Inclusive sports activities play a key role in the lives of persons with intellectual disabilities, helping them to fulfill their potential and become active members of society. At the same time, due to the active involvement of persons with intellectual disabilities in sports activities, stereotypes and prejudices are destroyed, which contributes to the formation of a more tolerant and open society [2, 4, 6]. The implementation of the management model of the Special Olympic Movement development at the regional level has a significant impact on the social sphere, forming new vectors of interaction between society, the state and people with intellectual disabilities [1, 3]. One of the key social effects is an increase in the level of inclusiveness in society [2, 6].

In addition, the introduction of this model contributes to the strengthening of social cohesion at the regional level, creates prerequisites for the development of volunteer movement, increasing civic engagement and strengthening social capital.

An important aspect is also the improvement of the quality of life of Special Olympics participants, including family members of people with intellectual disabilities [5]. Regular joint sports activities, participation in competitions and trainings contribute to physical and psychological development, increase self-esteem and self-confidence. This, in turn, has a positive impact on their social adaptation and the ability to lead a full life.

At the level of regional policy, the implementation of the Special Olympics development management

model stimulates the creation of new programs and initiatives aimed at supporting persons with intellectual disabilities []. This includes the development of infrastructure, training of specialists, as well as the introduction of innovative approaches to the organization of sports events. One such program is the project "Inclusive Sport for All" implemented by Special Olympics Russia in 15 regions of Russia. "Inclusive Sport for All" is a part of the 'Unified Sports' program supported by the Vladimir Potanin Charitable Foundation. The essence of the program is to conduct joint training and competitions between children with mental disabilities (athletes) and ordinary athletes (partners).

The purpose of the study. To identify the effectiveness of management of the development of regional branches of Special Olympics Russia on the basis of analyzing the results of the project "Inclusive Sport for All".

Methodology and organization of the study. A large-scale sociological study was conducted, including:

– online survey of project participants (743 parents of athletes; 100 guardians-relatives; 696 employees of child care institutions);

– focus groups with regional project supervisors: 3 focus groups, 15 respondents in total;

Research visits to the regions of the project implementation (4 visits to the regions: Ivanovo, Kostroma and Sverdlovsk oblasts, Republic of Tatarstan, field research on the program implementation in Moscow);

– focus groups and discussions with parents (6 individual interviews and 1 focus group in Kazan, 16 participants in total);

– interviews with trainers and staff of children's institutions (11 interviews and 1 focus group in Bui, total of 15 participants);

– expert roundtables in the regions of the program implementation (2 roundtables in Kazan and Kostroma, conference in Kazan);

– expert interviews - 6 interviews with internal and external experts);

– desk research of global and Russian practices (12 sources).

Within the framework of the conducted activities the following was studied:

- the impact of the project on the formation of an inclusive environment and socialization of children with mental disabilities (what are the real changes in the environment for the program participants);

- the impact of the project on social attitudes towards inclusion (how attitudes towards people with intellectual disabilities change).

The results of the study. The study revealed three groups of effects of the project: physical condition and health of the child, social and personal sphere. Inclusive sports made a significant and in some cases decisive contribution to the child's development in these areas. There are regional differences and peculiarities in the implementation of the program in subjects with stronger traditional education. The participation of students from a physical education and sports university gave a strong impetus to the development of the program in the city of Kazan.

The study showed that sport is the main additional activity in the life of the participating children besides medical therapy. Life of such children is usually poor, most of them are not engaged in any additional activities by default. An important aspect is also the involvement of families and loved ones of people with intellectual disabilities in the process of participation in the Special Olympics movement. This not only improves the psychological climate in families, but also contributes to their social adaptation. Parents and caregivers have the opportunity to share experiences, find support and participate in community life, which reduces social isolation and contributes to the formation of stable social networks.

The implementation of the Special Olympic Movement development management model at the regional level also has a positive impact on the educational sphere. The introduction of inclusive programs in educational institutions allows children and youth with intellectual disabilities to develop their physical and social skills, which contributes to their successful integration into society.

Finally, the social effects of implementing this model are manifested in the increased level of social responsibility of business and government structures. Participation in support of the Special Olympic Movement becomes an important element of corporate social policy, which contributes to the formation of a positive image of companies and strengthening their reputation. Government agencies, in turn, get the opportunity to more effectively implement social programs aimed at

supporting people with disabilities, which contributes to increasing the level of public trust in the authorities.

Conclusion. Thus, the implementation of the model of management of Special Olympics development at the regional level has a multifaceted positive impact on the social sphere, contributing to the formation of an inclusive society, strengthening social justice and improving the quality of life of people with intellectual disabilities. This not only improves their living conditions, but also creates prerequisites for sustainable regional development in the long term.

References

1. Lebedev E.V., Parfenova L.A., Lebedev E.V., Role of Special Olympics in training of personnel for rehabilitation of persons with intellectual development peculiarities. 2022. № 6. C. 66-68.
2. Parfenova, L. A., Gerasimov E.A. Inclusive physical education and sports technologies for students with intellectual disabilities . Teoriya i praktika fizicheskoy kultury. 2019. No. 1.p. 13.
3. Parfenova, L.A., Lebedev E.V., Tsukhlov N.A. Concept of the educational strategy of the Special Olympics of Russia. Teoriya i praktika fizicheskoy kultury. 2022. № 2. C. 85.
4. Salmova, A.I. Role of intellectual sports in social rehabilitation of adolescents with limited possibilities of health / A.I. Salmova., Parfenova L.A.// In Collection: Problems and innovations of sports management, recreation and sports and health tourism. Materials of the IInd All-Russian scientific-practical conference.
5. Fedorova. N.I. Competence of parents of children with intellectual disabilities in the field of adaptive physical education / N.I. Fedorova, L.A. Parfenova - Adaptive Physical Education. - 2020. - T. 81 , № 1. - C . 6-7.
6. Cherenshchikov, A.G., Parfenova L.A., Gerasimov E.A. Effective forms of physical education and sports interaction between youth and people with disabilities. Teoriya i praktika fizicheskoy kultury. 2018. № 9. C. 59.

Developing managerial skills in students of management programs through physical education

UDC 796.077.4

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Abstract

Objective of the study was to creation of a strategy that fosters the concurrent development of managerial skills through physical education for management students.

Methods and structure of the study. The study examined the involvement of 128 management students, divided into experimental and control groups, aged 19,2± 0,5 years, in a physical education program aimed at enhancing their professionally relevant physical fitness through simulated team game scenarios that required managerial decision-making.

Results and conclusions. It has been confirmed that the effectiveness of developing managerial abilities and personnel management skills through physical education is contingent upon the techniques employed to construct typological management scenarios within the context of physical education, which in turn fosters students' preparedness for managing personnel.

Keywords: *management competencies, physical education, active and playful educational environment.*

Introduction. In the conditions of post-industrial society, most professions are associated with intellectual costs of a specialist based on the synthesis of the coordinating and managerial aspects of activity. To produce a product or provide a service, raw materials, equipment, space, information and human resources are required, the quality of which entirely determines the competitiveness of an organization or enterprise. As a rule, the first four types of resources show a tendency towards technically stable reproduction, leaving the right to the human factor to ultimately determine the success of the organization.

Thus, a true competitive advantage lies in the effectiveness of human resource management.

Reproduction of human capital depends on the competence of a personnel specialist, including knowledge, experience, technical skills, motives, emotions, behavior.

The anthropocentric focus of physical education allows us to consider it not only as a means of forming motor potential, but also as part of non-specific preparation for managerial activity [3].

Many authors, considering the sectoral structure of physical education, emphasize the implicit nature of the connections between professional competencies and physical fitness of student managers [2]. From a pedagogical standpoint, an assessment is made of the effectiveness of the mobile and game educational environment of physical education, aimed at developing management competencies and managerial abilities of future HR specialists [4]. The research vector for solving this problem, as a rule, is focused on the development of pedagogical models for improving managerial competence by means of physical education of students [1]. The mutual dependence of innovations forms a mechanism for transferring a high level of physical fitness to the success of professional activities in the field of HR management [5].

Objective of the study was to creation of a strategy that fosters the concurrent development of managerial skills through physical education for management students.

Methods and structure of the study. An analysis of the participation of 128 student managers (repre-

sented by the experimental and control groups) aged 19,2±0,5 years in the process of physical education based on the improvement of professional and applied physical fitness in the conditions of modeling team game situations related to making management decisions was performed [3].

The factors of modeling team game situations that form management competencies were:

- non-standard nature and variability of game situations;
- diffusion of game and management components characteristic of the modeled type of activity;
- features of team interaction depending on the role functions of the player in the team;
- mental and physical state of students in the current lesson.

Based on the results of the scientometric analysis of the management competencies of management specialists, the following were identified:

- ability to set goals for personnel development, select methods and means of achieving them;
- ability to distribute key roles, responsibilities, related functions and area of responsibility of personnel;
- ability to achieve unity of the organization's management tasks and mobilization of human resources;
- ability to recursive thinking as a basis for coordinating acts of communicative interaction;
- skills of organization, coordination and objective assessment of the activities of employees and teammates;
- proficiency in the culture of communication, argumentation, reflection of one's own actions;
- ability to managerial innovations aimed at solving the intended tasks.

The methods of creating typological management situations in the process of mobile and game activities in the process of physical education were:

- creation of conditions for an mobile and game educational environment for physical education both during classes and during hours of sports and mass work;
- setting target guidelines for the preparation of ontogenetic and morphofunctional capabilities of students;
- variable and game focus of classes;
- focus of the operational segment of classes on synchronizing the developmental and educational processes;
- complexity of the impact of the load on the physical, psychological and intellectual components of those involved;
- a variety of physical education tools used.

The effectiveness of preparing students for their upcoming professional activities was assessed based on the assessment characteristics of state and municipal government experts on the quality of students' mastery of management competencies.

The obtained data were processed using statistical analysis methods in the STATISTICA 6.0 program.

Results of the study and discussion. Associated with the increase of motor activity and communication interaction, management competencies of students are formed on the basis of the use and capitalization of various forms and resources of physical culture. The universality of the mobile and game educational environment of physical education sets an innovative dimension of training and ensures the improvement of biometric parameters of motor skills, management competencies, decision-making abilities and management of student sports teams, as small groups of joint solution of management problems (see table).

The representativeness of management competencies formed as a result of modeling the conditions of the mobile and game educational environment of

Assessment of students' management competence

Name of competencies	Average score		p
	EG	CG	
The ability to achieve unity between the management objectives of the organization and human resources in the performance of professional tasks	4,2±0,16	3,8±0,11	<0,05
Ability to set goals for personnel development, select methods and means of achieving them	4,0±0,15	3,4±0,17	<0,05
Readiness for management innovations aimed at solving the identified tasks	4,1±0,13	3,5±0,16	<0,05
Possession of skills in organization, coordination and objective assessment of the activities of employees and teammates	4,3±0,18	3,6±0,20	<0,05
The ability to think recursively as a basis for coordinating acts of communicative interaction	4,3±0,15	3,8±0,14	<0,05

physical education is due to the actualization of subject tasks based on the complexity of the impact of the load on the physical, psychological and intellectual spheres of the students' personality. The resources of modeling team game situations, non-standard and variable actions expand the possibilities of activating the intellectual and managerial components of the educational and training process, mastering management competencies and sports skills by students. The management competence of students increased as a result of modeling the conditions of the mobile and game educational environment of physical education, ensuring the mastery of communication skills in a team. The coherent conditions for the formation of management competencies were: the creation of non-standard and variable game situations; the use of tools of a conjugate game and management nature; the distribution of role functions of players in a team; management of the mental and physical state of students in the lesson. The results show that the algorithms of the mobile-game educational environment of physical education, included in the structure of management training, have a high degree of influence on the readiness of students for management activities. The defining connections of the game and management components, characteristic of the mobile-game type of activity, form the transfer functions of physical education, causing an increase in professional competence and an increase in motivation for management activities of student managers. Modeling the mobile-game educational environment of physical education, affiliated with the development of refereeing, instructor and competitive practice, activates the intellectual substructures of "management readiness", forms management competencies and personnel management skills. The management context of professional and applied physical training reflects the processes of communicative interaction within the framework of the game role and the leader (captain, instructor, coach) of the team, which ensures the achievement of the development goal based on the optimization of the functional parameters of the complex of management competencies and personnel management.

Conclusions. Based on the conducted analysis of the connections, it can be concluded that the productivity of the formation of management competencies and personnel management skills by means of physical education is determined by the techniques of creating typological management situations in the process of physical education, contributing to the formation of the student's readiness for personnel management. Among the most important competencies formed by means of the mobile and game educational environment of physical education, it is necessary to note the ability to set goals for personnel development, select the ways and means of achieving them; the ability to achieve unity of the organization's management tasks and mobilize human resources; the ability to distribute key roles, responsibilities, related functions and the area of responsibility of personnel personnel; possession of the skills of organization, coordination and objective assessment of the activities of employees and teammates; the ability to managerial innovations aimed at solving the intended tasks; possession of the culture of communication, argumentation, reflection of one's own actions; the ability to managerial innovations aimed at solving the intended tasks. the ability to recursive thinking as the basis for coordinating acts of communicative interaction.

References

1. Zyukin A.V., Ponimasov O.E., Gabov M.V., Ryzhkin N.V. Neytralizatsiya neblagopriyatnykh urbanisticheskikh faktorov sredstvami ekologo-didakticheskoy sredy vuza. Teoriya i praktika fizicheskoy kultury. 2021. No. 10. pp. 108-109.
2. Kiryanova L.A., Ponimasov O.E., Kolesnikov N.V., Vinogradova O.P. Po- lifunktsionalnaya fitnes-tekhnologiya fizicheskogo vospitaniya studentov upravlencheskikh spetsialnostey. Teoriya i praktika fizicheskoy kultury. 2023. No. 7. pp. 74-76.
3. Lubysheva L.I. Fenomen samostoyatelnosti v fizicheskoy trenirovke studencheskoy molodezhi. Teoriya i praktika fizicheskoy kultury. 2024. No. 1. pp. 105.
4. Mironov A.O., Ponimasov O.E., Morozova L.V., Melnikova T.I. Antikrizisnaya strategiya realizatsii fizicheskogo vospitaniya studentov v usloviyakh ogranicheniya zhiznedeyatelnosti. Teoriya i praktika fizicheskoy kultury. 2023. No. 3. pp. 61-62.
5. Spiridonov E.A., Mironov A.O., Ponimasov O.E., Sayganova E.G. Sportivnaya deyatelnost kak sredstvo formirovaniya antistressovoy ustoychivosti studentov v obrazovatelnoy srede. Teoriya i praktika fizicheskoy kultury. 2024. No. 7. pp. 70-72.

Table tennis in the physical education curriculum for students in the Siberian region

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Keywords: *physical education, students, table tennis, Siberian region, university, analysis*

Objective of the study was to conduct an analysis of the cultivation of table tennis among students in universities of the Siberian region and to develop appropriate organizational and methodological measures.

Results of the study and discussion. Currently, the President and the Government of the country pay great attention to activating the population in physical education and sports. By 2030, it is planned to attract up to 70-80% of the population to proper physical education and an active lifestyle. In this direction, special attention is paid to increasing the motivation of student youth for systematic training in various sports. The most promising and motivated direction for activating students in physical activity is a sports-specific approach to physical education of student youth at the university. Providing students with a choice of various sports, where young people can realize their individual psychophysical potential, is the basic task of the modern process of physical education at the university. For young people, table tennis is a very democratic, accessible and emotional sport, it can be practiced all year round, it does not require large expenditures on sports equipment, develops coordination and speed of movements, enhances the functions of the visual organs, increases mental and physical performance, relieves psychophysical stress during long-term activity with various electronic devices and much more. In our article, we analyzed how much this accessible and social sport of year-round physical activity - table tennis - is in demand in universities of the Siberian region.

The results of the factual material are presented in Table.

The statistical results presented in the table clearly show the level of development of table tennis among student youth in universities of the Krasnoyarsk Territory.

Statistical analysis of table tennis cultivation in universities of the Siberian region (Krasnoyarsk Territory)

Contents of criteria	Statistical indicators
Number of universities in Krasnoyarsk Territory	16
Number of full-time students	43638
Number of universities participating in the Regional Universiade in table tennis	7 (44 %)
Number of universities practicing table tennis in students' physical education	2 (12,5 %)
Total number of students involved in table tennis in sports sections at the university	525 (1,2 %)

Conclusions. The conducted statistical analysis of the cultivation of table tennis among students in the universities of the Krasnoyarsk Territory showed the following:

- only 7 table tennis teams participate in the Regional Universiade, which is 44% of the total number of universities in the region;
- only 2 universities practice table tennis classes in physical education among students, which is 12.5%;
- the total number of students involved in table tennis in the sports section at the university is 525 people (1.2%) - from the total number of full-time students in the region.

These statistical results state the need to develop the necessary organizational and methodological measures to stimulate the development of mass table tennis classes among student youth in the region.

References

1. Doroshenko S.A., Ponomarev V.V. Sportivno-vidovoy podkhod v fizicheskom vospitanii studentov v vuze. Monograph. Krasnoyarsk: SibGTU publ., 2010. 178 p.

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Prerequisites for the use of phygital technologies in adaptive sports

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Key words: *adaptive sport, persons with disabilities, fijital sport.*

Introduction. Today, information technology and digitalization penetrate into all spheres of human life. Sport as a platform for competitive activity is always looking for new ways to achieve goals [1]. Computer technology has become one of such ways. Thanks to the digitalization of sport, it has not only become more accurate, faster and advanced, but also accessible. People with disabilities have a chance not only to bypass all the limitations, but also to touch those sports that previously were simply not available to them.

The purpose of the study: To study the prerequisites for the use of phygital technologies in adaptive sport.

The results of the study and their discussion. The analytical company DFC Intelligence [2] published a big report on the popularity of the game industry. According to the publication, as of the beginning of 2023, the total audience of video games is 3.7 billion people - that's 46% of the total population of the Earth. According to the latest research by marketing firm Childwise, children aged 5 to 16 spend an average of 6.5 hours a day playing video games on smartphones, tablets and other electronics. It is worth noting that people with disabilities spend even more time in “gadgets” due to the limited range of possible activities.

In the 2020s of the 21st century in Russia, a new approach to the concept of “computer sport” was invented and tested, combining it with physical sport called “phygital”. For people with health disabilities, this format offers several advantages at once. Firstly, for each person who decides to take part in fijital sports, there is an opportunity for a two-way impact, namely cognitive and physical development. Regardless of the degree and form of impairment of people with disabilities, the digital and physical parts will mutually replace each other. Secondly, phygital sport is a huge base for building inclusive competitions and training, where through a common interest in sport and digital technology, people with disabilities will socialize, communicate and build the foundation for a civil society. And thirdly, phygital sport can be a tool to popularize physical sport for people with disabilities. We conducted trial fijital competitions on inclusive fijital soccer, where children 14-18 years old with intellectual disabilities and their normotypical peers first received a team by FC24 by drawing lots and 4 team members competed in digital reality, after which the whole team went to the playground and played mini-football.

Adaptive sport is one of the six types of adaptive physical culture, which, in turn, is a type of physical culture designed for persons with disabilities and mirrors all the components and types of physical culture.

Thanks to special rules and equipment, it has become possible to provide equal opportunities in sport for those who are unable to participate in conventional programs. The adaptive physical education instructor plays an important role in this process. He or she has the knowledge and skills to develop individual training programs, taking into account the health characteristics of each participant. For each nosology there are specific features of competitions, so, for example, working with people with intellectual disabilities we are based on the basic principles of the Special Olympics - which puts the main goal is not the achievement of results, but the maximum involvement in the training and competition process, all participants.

Conclusion. Thus, phygital technologies not only act as an improvement of sport in its classical sense, but also open up the possibility for people with disabilities to play new sports, find a common language with peers and try themselves in sports.

References

1. Ermakov A. V. Problems and prospects of computer sport development in Russia at the present stage //Computer sport (cybersport): state and prospects of development. Interregional scientific and practical conference. – 2020. – C. 58.
2. Brendan Sinclair, Ways to improve the physical culture and wellness competence of parents of children with intellectual disabilities/ https://www.gamesindustry.biz/dfc-global-game-audience-reaches-37-billion/

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The role of self-motivation in the physical culture and recreation activity

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Keywords: *motives, self-motivation, self-preservation of health, motor activity, physical culture, university students.*

Relevance. Motivation is the process of stimulating activities to achieve certain goals. Motivation can also be defined as the structure of a subject's activity and behavior. Scientific researchers consider the influence of many motivation factors on human behavior and confirm that it is completely individual and can change depending on various motives and analysis of human activity. Self—motivation is an active motivation that allows you to act effectively and have internal motivation [1].

The purpose of the study: to identify the most significant motive for university students, encouraging physical culture and recreational activity.

The results of the study and their discussion. As part of the study, the students underwent testing, the purpose of which was to determine the leading motive (evaluation of 30 proposed statements), to form their significance for themselves according to a 5-point rating system, where "5" - I completely agree, "4" - I rather agree than disagree. I disagree, "3" - partially agree, "2" - neutral and "1" - strongly disagree, the article presents some of them.

To identify the formation of the "Self-preservation of health" motive, students had to evaluate the following statements: "I always look forward to physical education and sports, because they strengthen my health": 36.5% of respondents chose a score of "5" points, "4" - 22%, "3" – 21%, "2" – 13% and "1" – 7.5%. "Additional physical exercise is good for health, because regular physical education and sports are not enough": 38% of respondents chose the assessment "5", "4" – 23%, "3" – 23%, "2" – 8% and "1" is 8%. It was found that for half of the students surveyed, the motive of "Self-preservation of health" is the leading one.

To determine the influence of the "Self-improvement" motive, students were asked to evaluate their attitude to the statements: "Physical education and sports classes help me cultivate will and determination»: 48% of respondents chose a score of «5», 20% – «4», 18% – «3», 8% – «2» and «1» – 6%. "In physical education and sports classes, I cultivate courage, determination and self–discipline": 44% of the respondents chose a score of «5» points, «4» – 24%, «3» – 16%, «2» – 8% and «1» - 9%. For the majority of students, this motive is the leading one, for a quarter it is the average in importance.

To determine the influence of the motive "Motor activity", students were also asked to assess their attitude to the following two statements: "I always find an opportunity to engage in physical education because movement gives me joy": 41% of respondents chose a score of «5», 19% – «4», «3» – 22%, «2» – 9% and «1» – 9%. "During a break from academic activities, I like to move and exercise a lot": 36% of respondents chose a score of «5», «4» – 24%, «3» – 22%, «2» – 9% and «1» – 9%. After adding up the scores of both statements, it was found that the influence of the motive "Motor activity" is moderate for a quarter of the surveyed students, and leading for half.

Conclusion. Our research has shown that for university students, "self-motivation" is the most significant motive. However, for half of the students surveyed, all motives are moderate and insignificant, which can be changed by implementing an experimental program.

References

1. Personal physical culture and its place in everyday life of university students / A. I. Golubev, G. N. Golubeva, I. G. Kalina, R. A. Aidarov // International Journal of Applied Exercise Physiology. 2019. Vol. 8, No. 3. P. 109-114.

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The study of the level of development of motor and coordination abilities in children aged 12-13 years with mental disorders

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Keywords: *mental disorders, program for the development of motor and coordination abilities, table tennis, psychophysical development.*

Relevance. According to the World Health Organization, the prevalence of intellectual disabilities in the population ranges from 1 to 3% of the population. According to statistics from the Ministry of Health of the Russian Federation, the prevalence of intellectual disability in Russia is just over 0.6% [3, 4].

The level of development of motor coordination abilities (MCS) depends on the characteristics of intellectual development. Children with mental impairments in the development of dexterity, balance, and accuracy lag significantly behind their healthy peers [1, 2].

The purpose of the study: to study the motor and coordination abilities of children aged 12-13 with intellectual disabilities.

Materials and methods of work. The following methods of scientific research were used in the work: theoretical analysis and generalization of literary sources, statistical experiment, pedagogical testing, methods of mathematical statistics.

The study was conducted on the basis of the Kazan State Educational Educational Institution Kazan School No. 76 for Children with Disabilities. The ascertaining experiment involved 15 children aged 12-13 years with intellectual development disorders.

The results of the study and their discussion. The ascertaining experiment showed that the results of reaction speed tests were assessed as unsatisfactory (165.00 9.74 cm and 43.10 6.24 cm, respectively), which indicates a low level of CNS functionality in children with intellectual disabilities. Children with intellectual disabilities have an imbalance and poor vestibular stability due to damage to the central nervous system, as evidenced by the results of the Romberg test (3.95±1.94 s) and the Unterberger step test (57.24 degrees). Children with intellectual disabilities have a low level of accuracy development associated with difficulties in differentiating temporal and spatial parameters and muscle effort, which is confirmed by the results of a ascertaining experiment (throwing a tennis ball at a target – 4.10± 1.26 times). Concentration of attention is characterized by the intensity of its conscious concentration on the selected object. This indicator is at a low level in children with intellectual disabilities and corresponds to the 4th rank (66.54±16.92) geometric shapes in 60 seconds, rank 4.36±0.28). In children with intellectual disabilities, the volume of dynamic attention is at a very low level (84.60±9.61 seconds).

Conclusion. The results of the study showed that the level of development of motor coordination abilities and indicators of attention properties in middle school-age children with intellectual disabilities differ significantly from the norm, which confirms the fact that the level of development of motor coordination abilities depends on the characteristics of intellectual development. In this regard, for children aged 12-13 with mental disabilities, a well-founded, step-by-step program for the development of motor and coordination abilities is needed, aimed at increasing the speed of motor reaction, improving balance, vestibular stability and accuracy, increasing volume and concentration of attention, and developing communication skills.

References

1. Artemenko E. P., Litosh N. L. The development of motor and coordination abilities of children with intellectual disabilities involved in table tennis // Modern issues of biomedicine. 2022. Vol. 6. No. 4. pp. 325-332 DOI: 10.51871/2588-0500_2022_06_04

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