



Development of Cybathletics: Integration of Autogenic Training

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Abstract

Objective of the study is to determine the impact of using self-regulation methods (autogenic training, visualization, breathing techniques) on the emotional state, concentration, and athletic performance of cybathletes during the preparation stages and during competitions.

Methods and structure of the study. To achieve this goal, the following methods were used: analysis and synthesis of specialized scientific and methodological literature; observation of the cybathletes' behavior and reactions; application of the anxiety assessment method of Ch.D. Spielberger and Yu.L. Khanin; statistical analysis of the obtained data.

The study was conducted on the basis of two sporting events: the VII Martial Arts and Strength Sports Festival in Honor of Grand Duke Dmitry Donskoy (October 25–26, 2025, Suzdal) and the Cybathletics Festival, which was timed to coincide with Yaroslavl City Day 2025 (May 31, 2025). Thirty cybathletes participated in the study. The participants in the competition were individuals with disabilities who use technical rehabilitation equipment.

Results and conclusions. The conducted study showed an improvement in the overall psychological state and an increase in the stability of the performance of cybathletes after the systematic use of elements of autogenic training in the preparation process. A decrease in the level of anxiety before competitions and an increase in concentration directly during the performance were noted. The findings of the study confirm that the use of autogenic training in the process of preparing cybathletes makes it possible to: increase the psychological resilience of cybathletes before competitions; ensure higher-quality exercise performance by stabilizing the emotional state of participants with disabilities; and optimize the process of athletic preparation, making it more effective.

Keywords: *cybathletics, people with disabilities, psychological preparation, rehabilitation, autogenic training, physical exercise.*

Introduction. The first international “Cybathlon” competitions were held on October 8, 2016, in Zurich [10]. This unique event brought together people with disabilities who used high-tech assistive devices, including prostheses, exoskeletons, and neurointerfaces. The Cybathlon is not an Olympics, nor even a Paralympics; it is precisely a competition of the technologies used by cybathletes. The main goal of this discipline is to demonstrate the capabilities of technologies and to adapt people with disabilities to an active life.

In Russia, the Cybathlon came to be called cybathletics, and its participants – cybathletes [4]. The term

“cybathletics,” which arose in the Russian information space, became a symbol of innovative approaches to the development of elite sport and the social integration of persons with disabilities. The international recognition of the discipline is confirmed by the fact that ten countries (Vietnam, Egypt, India, Indonesia, Iran, Malaysia, Nigeria, Russia, Saudi Arabia, South Africa) have already signed a memorandum of intent to create an international cybathletics league [7], which testifies to its growing influence on the world community. At the same time, the domestic practice of organizing sporting events is also actively developing. One striking example is the third open Moscow championship



in cybathletics, held from September 13 to 15, 2025. This event became a platform for demonstrating the latest developments and achievements of Russian engineers, who contribute to the development of the domestic sports movement [6]. Such events allow cybathletes to demonstrate the unique abilities of controlling high-tech devices, contributing to the popularization of cybersports disciplines among a wide audience.

Of particular note is the registration by the Ministry of Justice of the Russian Federation of the Interregional Physical Culture and Sports Public Organization "Cybathletics Federation," which took place on January 28, 2026 [8]. This procedure consolidated the official status of the new sports federation, becoming an important stage in the institutionalization of the discipline in our country. The organization is designed to coordinate the activities of the community participants, develop the regulatory framework, organize competitions of various levels, and ensure the training of qualified specialists. Thus, cybathletics is becoming part of the global trend of introducing advanced technologies, opening new horizons for the self-realization and personal growth of people with special needs.

The development of the discipline also contributes to improving the quality of life of people with physical disabilities, providing them with the conditions for full participation in public life and the achievement of success at the professional level.

From 2022 to the beginning of 2026, more than 300 cybersportsmen took part in competitions in Russia. At many competitions, round tables are held on the topics of adaptive physical culture and sports, as well as the features of using various rehabilitation techniques (hereinafter – TRE, technical rehabilitation equipment) [10].

The relevance of the topic is due to the need to analyze the current trends and prospects for the further development of cybathletics as a sport of the future. Scientific and technological progress creates the prerequisites for the formation of a fundamentally new approach to the physical education and health improvement of the population, allowing people with physical disabilities to achieve outstanding results thanks to the use of modern technical solutions.

Psychological resilience is a key factor in the success of any athlete [2, 5], and especially of cybathletes, since disabilities create additional loads that affect the effectiveness of a cybathlete's performance. Therefore, a special training system that includes ele-

ments of psychophysical preparation becomes an important tool for improving results.

Objective of the study is to determine the impact of using self-regulation methods (autogenic training, visualization, breathing techniques) on the emotional state, concentration, and athletic performance of cybathletes during the preparation stages and during competitions.

Methods and structure of the study. Analysis and synthesis of specialized scientific and methodological literature on the psychological preparation of athletes with disabilities was applied; observation of the behavior and reactions of cybathletes; the method of anxiety assessment of Ch.D. Spielberger and Yu.L. Khanin was used to assess the emotional state of cybathletes; statistical analysis of the obtained data.

Results of the study and discussion. In the process of preparing for the tournament "VII Martial Arts and Strength Sports Festival in Honor of Grand Duke Dmitry Donskoy" (October 25–26, 2025), the organizing committee approved the rules of the regional tournament – Cybathletics SUZDAL 2025. The competitions were held in cybathletics in the following disciplines: forearm prostheses (ARM), shin and thigh prostheses (LEG). At the Cybathletics Festival, which was timed to coincide with Yaroslavl City Day 2025 (May 31, 2025), the competitions were held in the disciplines: shin prostheses, thigh prostheses, including double amputation.

The peculiarity of the competitions in the ARM and LEG disciplines lies in the fact that the use of any means of movement (for example, support frames, crutches, canes, etc.) during the competitions is prohibited. The participants in the competitions cover the distance against the clock and must correctly perform motor tasks (exercises), which are different for each discipline.

Each pilot is assessed relative to the results of all the other pilots in a particular discipline, depending on the time, the covering of the distance, and the points scored. If, in one discipline and at the same stage of the competition, two or more pilots score the same number of points for completion at the same completion time, then an additional race is held to determine their places in the overall standings of the discipline.

The main differences between the two tournaments:

Yaroslavl (May 31). Emphasis on lower-limb prostheses (shin and thigh), including a category for people with double amputation.

Table 1. Comparative analysis of cybathletics tournaments (2025)

Comparison criterion	Festival in Yaroslavl (May 31)	Tournament in Suzdal (October 25–26)
Status of the event	Timed to coincide with City Day	Within the framework of the VII Festival named after Dmitry Donskoy
Disciplines (lower limbs)	Shin, thigh prostheses (incl. double amputation)	Shin and thigh prostheses (general LEG category)
Disciplines (upper limbs)	Not declared	Forearm prostheses (ARM)
Priority of preparation	Technical: primary mastering of technologies	Psychophysical: psychological resilience
Key method	Adaptation to the prosthesis	Adaptation to the prosthesis and a system of autogenic training
Result of implementing the methodology	Mastery at a basic level	Qualitative growth of the stability of athletes

Table 2. Influence of autogenic training on the participants of the competitions in Yaroslavl and Suzdal in cybathletics

Sphere of influence	ARM discipline (forearm prostheses)	LEG discipline (shin and thigh prostheses)
Fine motor skills and precision	Reduction of stump tremor. Allows more precise control of the prosthesis myo-sensors when gripping small objects	Improvement of coordination. Helps to position the foot more precisely when overcoming obstacles (stairs, bumps)
Muscle tone	Relief of clamps in the shoulder girdle, which increases the amplitude of movements and the speed of manipulations	Optimization of tension in the muscles of the stump and back
Phantom pains	Relief of uncomfortable sensations that can distract from performing the technical task	Reduction of the intensity of phantom pains, which intensify under physical load on the supporting leg
Psycho-emotional background	Formation of a “state of flow” for the rapid change of action algorithms (everyday tasks against the clock)	Suppression of the fear of falling when passing dynamic stages (inclined surfaces, stepping over)
Sensory integration	Improvement of the mental acceptance of the prosthesis as “one’s own” hand, which speeds up the reaction time	Enhancement of proprioception (the sense of space), helping to “feel” the surface through the prosthesis socket

Suzdal (October 25–26). A broader coverage, including both arm prostheses (forearm – ARM) and leg prostheses (shin and thigh – LEG).

At the above-mentioned 2025 tournaments in Yaroslavl and Suzdal, the psychological preparation of cybathletes played a key role. Autogenic training (AT) is a method of self-suggestion [1, 3, 5], which allows athletes with limb prostheses to manage their psycho-emotional and physical state before going onto the track.

Below is a comparative analysis of the disciplinary achievements and the focus of preparation for the tournaments in Yaroslavl and Suzdal based on the protocol data (Table 1) [6].

Below is a table of the influence of AT on cybathletes depending on the specifics of the disciplines (ARM and LEG) (Table 2).

Also, in the course of the experiment, a program of autogenic training (AT) for cybathletes was tested, which included several stages: basic relaxation, neurointegration (acceptance of the prosthesis), ideomotor tuning, and mobilization. Since, for a cybathlete, it is important not just to relax, but to “synchronize” with their technical rehabilitation equipment. In this regard, various exercises, formulas, etc., which A.V. Rodionov used in his works, were applied [2, 9].

The study was conducted on two groups of cybathletes: an experimental one (with the use of AT) and a



control one (without AT). The main results are listed below.

1. Reduction of the level of anxiety

The assessment was carried out using the method of Ch.D. Spielberger and Yu.L. Khanin before and after the application of AT.

Experimental group:

- before the application of AT, an increased level of situational anxiety before the start was observed, characteristic of competitive stress;
- after the cycle of sessions, a steady reduction of anxiety before performances was noted – the cybathletes described their state as “more calm,” “confident”;
- the severity of the physiological manifestations of anxiety (rapid breathing, trembling, etc.) decreased.

Control group:

- no significant changes in the level of anxiety were revealed;
- before the start, signs of emotional tension persisted.

2. Increase in the stability of athletic results

The analysis was carried out on the basis of data on the time of covering the distance and the number of successfully completed tasks.

Experimental group:

- the results of the performances became more stable from start to start;
- the number of gross errors associated with the loss of coordination or the ineffective distribution of efforts decreased;

Control group:

- the demonstrated results were characterized by high variability;
- cases of a sharp decrease in effectiveness in the second half of the performance were recorded.

Conclusions. The results of the conducted study confirm the effectiveness of using autogenic training in the preparation of cybathletes. The AT program contributed to: the reduction of emotional tension before competitions; the improvement of concentration in the conditions of competitive activity; the formation of a sense of unity of the body and the technical rehabilitation equipment.

Key advantages of the method:

- ease of implementation into the training process;
- the absence of the need for additional equipment;
- the possibility of adaptation to the individual characteristics of the athlete and the type of prosthesis.

Russia possesses significant experience in the development and implementation of innovative rehabilitation tools and methods of psychophysical preparation. This experience can become the basis for international cooperation and the development of cybathletics as a global movement.

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