



# Theory & Practice of Physical Culture

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Athletic  
training

Sport  
psychology

Academic  
physical education

Sport  
physiology





## Sports science in the trend of innovation

Today, the main trend in promising areas of research in sports is the development and application of high-tech training process management and injury reduction.



A significant part of the work is devoted to biomechanical motion analysis systems, which make it possible to evaluate performance techniques, identify errors and find ways to correct them. As a rule, GPS monitoring systems are used for this purpose to track the movements of athletes during the training and competition process, which allows them to analyze their activity, calculate the distance traveled, speed and other parameters. In addition, the research uses sensor devices to monitor physiological parameters that allow you to measure pulse, respiratory rate, hydration level and other parameters, which allows athletes and coaches to monitor the condition of the body and adjust the training process.

Another scientific trend of research in sports science is the development and improvement of sports equipment, in particular simulators. Sports equipment is constantly undergoing the evolution of materials and increasing versatility. As you know, modern simulators are software-controlled devices that help improve diagnostic accuracy, fitness, and movement techniques.

Currently, the scientific community is paying close attention to the issues of personnel training for the FKIS. Success in the modern world is impossible without qualified coaches, teachers and other specialists with knowledge in the field of sports science. Today, professional training in educational institutions

is focused on the integration of scientific research and practice. In this context, such types of educational activities as:

- development of training programs based on the principle of evidence-based practice, based on the results of sociological research and best practices in sports practice,
- promotion of interactive teaching methods: simulation, gamification, case study, for the development of universal and professional competencies of students,
- organization and implementation of interuniversity sports and social projects for students to gain valuable experience and establish contacts.

Publishing practice shows that a significant number of modern research in sports science is conducted using digital means, where such digital transformation trends have developed as: the use of wearable electronic controlled devices to monitor a person's physical condition in an educational environment and sports activities, the use of mobile applications in teaching and managing the training process, the use of machine vision technologies in analysis and modeling of athlete's movements, development of digital sports

Modern sports science continues to actively develop through the expansion of research in the field of innovative technologies: from sports technology and equipment to training and digital transformation. Scientific work is aimed at achieving high athletic results, reducing injuries and expanding the possibilities of mass sports. Further research and scientific developments in these areas expand the horizons of the future of sports science and sports in general.

*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  
Dr. Hab., Professor L.I. Lubysheva**

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Theory and Practice  
of Physical Culture

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# Organisation of physical rehabilitation and habilitation of preschoolers with severe multiple developmental disabilities

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## Abstract

**Objective of the study** is to develop and substantiate a pedagogical model of physical rehabilitation and habilitation of preschoolers with severe multiple developmental disabilities (SMDD) based on an assessment of their physical development, motor abilities and typological characteristics.

**Methods and structure of the study.** Analysis of scientific literature and modern approaches to physical rehabilitation of children with SMDD; a ascertaining experiment in three specialized institutions of preschool education; modeling of the rehabilitation and habilitation process.

**Results and conclusions.** The theoretical and methodological foundations of physical rehabilitation and habilitation of children with SMDD have been determined, criteria for a comprehensive assessment of physical development and motor abilities have been developed, diagnostic tools have been identified, and four typological groups of children with SMDD have been identified. A model has been developed, the conceptual basis of which is a functional approach aimed at increasing the adaptive capabilities of the body and the formation of motor skills necessary for the daily activities of children with SMDD.

**Keywords:** *physical rehabilitation, physical habilitation, severe multiple developmental disabilities, preschool age.*

**Introduction.** The issue of physical rehabilitation and habilitation of children with SMDD is becoming particularly important in the context of current trends in the development of special education systems. According to statistics, the prevalence of SMDD ranges from 1.0 to 2.5% of the child population, with a steady upward trend in the number of children in this category [2].

Severe multiple developmental disabilities are a combination of two or more psychophysical disabilities (intellectual, sensory, motor, speech) that significantly impede normal development and require special learning conditions. The complex nature of these disabilities makes the tasks of physical rehabilitation and habilitation for these children particularly difficult.

The preschool period is sensitive for the formation of motor skills, but in children with SMDD this process is difficult due to a pronounced lag in physical development and motor function disabilities [1]. Existing physical education programmes often do not take into

account the complexity of the problem, and preschool institutions often lack the conditions for full physical education and rehabilitation support. Studies show the need to develop innovative physical rehabilitation techniques that take into account the individual characteristics of children with SMDD [2, 3, 5]. It is especially important to scientifically substantiate a systematic approach that integrates medical, psychological, and pedagogical technologies into a single rehabilitation space in a preschool institution [2, 5, 6].

**Objective of the study** is to develop and substantiate a pedagogical model of physical rehabilitation and habilitation of preschoolers with severe multiple developmental disabilities (SMDD) based on an assessment of their physical development, motor abilities and typological characteristics.

**Methods and structure of the study.** Analysis of medical, psychological, pedagogical, and scientific literature on the research topic; systematic analysis





of contemporary approaches to physical rehabilitation and habilitation of children with SMDD; a diagnostic experiment to identify the initial level of physical development and motor abilities of children with SMDD (based on three compensatory preschool education institutions in Kazan); modelling of the rehabilitation and habilitation process in preschool education institutions.

**Results of the study and discussion.** Based on an analysis of contemporary scientific approaches [1-6], conceptual principles for the physical rehabilitation and habilitation of children with SMDD were formulated (see Figure 1).

<b>Unity of diagnostic, corrective, developmental and preventive tasks</b>
<b>Consideration of the structure of the disability and mechanisms for its compensation</b>
<b>Focus on a functional approach to evaluating effectiveness</b>
<b>Interdisciplinary interaction between specialists</b>
<b>Integration of medical, psychological and pedagogical technologies</b>
<b>Systematicity and continuity</b>
<b>Involvement of parents as active participants in the process</b>

Fig. 1. Conceptual provisions of the rehabilitation and habilitation process

The general sample of the study included 68 children with SMDD aged 4 to 7 years (mean age  $5.7 \pm 0.9$  years), of whom 39 were boys (57.4%) and 29 were girls (42.6%). All children were diagnosed with a combination of two or more developmental disorders of varying aetiology and severity:

- moderate to severe intellectual disabilities – 68 children (100%);
- motor disorders – 54 children (79.4%);
- visual impairments of varying degrees – 37 children (54.4%);

- hearing impairments – 15 children (22.1%);
- autism spectrum disorders (ASD) – 21 children (30.9%);
- epileptic syndrome – 18 children (26.5%).

At the next stage, a comprehensive examination of children with SMDD was carried out using the developed diagnostic tools (see Table 1). Physical development, functional state of the body, nature of the formation of basic movements, psychomotor development, and adaptive skills were assessed.

The test results confirmed significant delays in the physical and motor development of children with SMDD:

- physical development indicators in 82% of children were below age norms;
- functional indicators of the cardiorespiratory system showed a decrease in the functional reserves of the body in 76% of children;
- gross motor skill impairments were observed in 91% of children;
- poor fine motor skill development was noted in 97% of children;
- movement coordination impairments of varying severity were identified in 100% of children;
- reduced muscle strength indicators were observed in 85% of children.

Based on the data obtained, a cluster analysis was performed, which allowed us to identify **four typological groups of children with SMDD**, differing in the nature and severity of motor disorders, the preservation of sensory systems, and the level of psychophysical development:

**1. Group with predominant motor disorders** (31% of children) – children with pronounced disorders of the musculoskeletal system combined with intellectual disorders.

**2. Sensory-motor group** (24% of children) – children with a combination of visual/hearing, motor, and intellectual disorders.

**3. Group with impaired voluntary movement control** (27% of children) – children with intellectual

Table 1. Methods for diagnosing the psychophysical development of children with SMDD

<b>Methods for testing physical and functional development</b>	<b>Psychodiagnostic methods</b>
- <b>Anthropometric measurements</b> (height, body weight, chest circumference, vital capacity)	- <b>Neuropsychological examination</b> (modified version of A.R. Luria's method for preschoolers with SMDD)
- <b>Testing of physical qualities using adapted tests</b>	- <b>Assessment of psychomotor development</b> using the method developed by N.M. Ozeretsky, modified by M.O. Gurevich and N.I. Ozeretsky
- <b>Assessment of the functional state of the body</b> (heart rate, blood pressure, Stange and Genchi tests)	- <b>Vineland Adaptive Behaviour Scales</b> - <b>Stott Observation Chart</b> (modified version)



impairments and autism spectrum disorders, characterised by stereotypical behaviour and problems with voluntary movement control.

**4. Group with multiple combined pathologies** (18% of children) – children with a complex of severe disorders, including epileptic syndrome, requiring constant support.

**Conclusions.** The proposed typology, reflecting the specifics of motor disorders in children with SMDD, made it possible to differentiate approaches to their physical rehabilitation and habilitation, to develop a comprehensive model, whose conceptual basis is a functional approach focused on improving the body's adaptive capabilities and forming the motor skills necessary for the daily activities of children with SMDD.

The model has a four-component structure (diagnostic, content-planning, organisational and assessment blocks), ensuring the integrity of rehabilitation. The diagnostic block identifies the individual potential of the child through the author's assessment methodology. The content and planning block provides for the development of differentiated programmes taking into account typological groups. The organisational block integrates traditional and innovative methodologies adapted to the needs of each group. The assessment unit monitors the effectiveness of the programmes and makes adjustments. An important advantage of the model is that it can be implemented in a preschool setting with the teamwork of specialists from different fields and the active participation of parents.

The completed stage of the research opens up prospects for the implementation and practical testing of the developed innovations in the context of an organised pedagogical experiment.

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