

**Research Article**

## **Psychophysical abilities of children with Down syndrome**

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### **ABSTRACT**

**Objective:** to consider the psychophysical capabilities of athletes with Down syndrome.

**Material and methods:** For the work were selected 19 children aged 10 to 14 years with mental retardation and 12 children with Down syndrome aged 10 to 16 years. Applied physiological and statistical research methods.

**Results:** It has been found that in children with Down syndrome, unlike mentally retarded children, there is a polymorphism of the existing defect and a number of these changes, which create significant obstacles in mastering sports skills, including sports. Children with mental retardation and children with Down syndrome are heterogeneous groups in their psycho-physiological properties in terms of mental retardation parameters. This applies to intellectual development, motor development, emotional development. They cannot be considered as groups with similar characteristics and the results of their sports activities cannot be correctly compared.

**Conclusion:** In children with Down syndrome, in contrast to mentally retarded children, polymorphism of manifestations of defects and related developmental disorders, including locomotor and speech functions, which create significant, is noted. Some similarity of symptoms in mentally retarded people and people with Down syndrome is not a reason to consider these two groups of people as a homogeneous group with a common characteristic. Athletes with mental retardation and athletes with Down syndrome in competitive practice will not be combined into one group due to strong differences in their psychophysical status.

**Key words:** Children, Down syndrome, Mental retardation, Intellect, Emotionality.

### **INTRODUCTION**

The processes of ontogenesis, as all previous studies have shown, are extremely complex and highly susceptible to various influences.<sup>1,2</sup> Negative factors can cause disturbances at different levels of regulation and sometimes lead to complex persistent disturbances in the body.<sup>3</sup> For an in-depth understanding of the essence of the functioning of the body, the need to study the profiles of the psychomotor development of people with different types of genetic disorders is becoming clearer.<sup>4</sup> The greatest interest in this regard is the study of the most common disorder - Down syndrome.

This information is very relevant in connection with the growth of trends in society towards the maximum possible involvement of people with

developmental disabilities (including people with Down syndrome) in various spheres of society, including education, work, physical culture and sports.<sup>5</sup>

For the first time, the opportunity to participate in sports activities for people with Down syndrome was provided by the international organization Special Olympics Inc., which since 1968 has been conducting training and competitions among people with intellectual disabilities in many countries around the world. At international competitions "Special Olympics Inc.", it became clear that the number of people with Down syndrome among the participants of these competitions has increased significantly over the past 10 years. The International Sports

Federation of Persons with Intellectual Disabilities returned to the Paralympic movement, which opened up the possibility for athletes with intellectual disabilities to participate in high-profile sports. At the same time, in this new program, the question of the participation of athletes with Down syndrome is not quite the main question is whether their participation in the Paralympics competition on the principles of equality and correct comparison of results is possible. Due to the absence in the International Sports Federation for persons with intellectual disabilities, athletes with Down syndrome must compete with other participants with mental retardation, but who do not have other disorders characteristic of Down syndrome.<sup>6</sup>

Studies of children with Down syndrome have shown that they, together with a lag in intellectual development, are characterized by very serious movement disorders - congenital hypotoneus, insufficient and uniform equilibrium reactions, difficulties with any movements requiring rotation of the body and irregular patterns of movement.

During the competitions in the framework of the Special Olympiad, an athlete and a coach work taking into account the skills and abilities of an athlete, taking into account primarily social issues: preservation of health, enjoyment of participation in training and competitions, ensuring social contacts, informing society about the physical potential of athletes with disabilities . Often, in this regard, the capabilities of athletes with Down syndrome are underestimated due to the lack of incentives for sports improvement.<sup>7,8</sup>

Until now, the psychophysical features and physical potential of the individuals with Down syndrome in terms of their participation in sports have not been fully investigated. Nevertheless, many years of experience in training and participating in competitions indicates that people with Down syndrome have physical and mental differences from people with mental retardation who do not have this syndrome, which does not give grounds to consider these two groups as fully comparable in existing psycho-physiological characteristics in the

group of persons with mental retardation. Therefore, the results of sporting achievements of these categories of participants cannot be correctly compared.<sup>9</sup>

Up to 75% of children with Down syndrome have moderate mental retardation, 5% are severe, and 20% are mild. In this regard, we can say that persons with Down syndrome constitute a specific subgroup in the group of persons with mental retardation. This feature is related to the fact that persons with Down syndrome have significant polymorphism in the clinical picture and in their psychophysical, mental and emotional state.<sup>5</sup>

Objective: to consider the psychophysical capabilities of athletes with Down syndrome.

## **FEATURES OF INTELLECTUAL DEVELOPMENT**

A comparison was made of the severity of mental retardation (the results of the diagnosis of the Wechsler test); checked the reaction of differentiation of thought processes and the reaction of choice.

For the work were selected 19 children aged 10 to 14 years, who have mental retardation and 12 children with Down syndrome aged 10 to 16 years, the first time the study by test Wechsler.

Among the 19 children with mental retardation without Down syndrome, 17 people who had been tested according to the Wechsler test had a diagnosis of "Mild mental retardation". The number of points scored by them ranged between 68 and 57. Two children had a diagnosis of "Mild mental retardation" and scored points from 50 to 41.

Of the 12 children with Down syndrome, eleven had moderate mental retardation (they were able to score from 49 to 31 points). One child in this category had a mild mental retardation. He scored 56 points on the test Wechsler. The states of mental processes in both groups of children were specifically effective. They have an insufficiently formed reaction of differentiation of thought processes, a reaction of choice.

During the assessment of the level of intellectual development in people with Down syndrome, it is noted that they cannot and are not able to

integrate their sensations - simultaneously focus attention, look, listen, react, and therefore cannot process signals from more than one stimulus at the same time.

It is believed that in people with Down syndrome, mental retardation is always combined with psycho-physiological underdevelopment. Individuals with Down syndrome condition is always seriously burdened: hypoplasia of the endocrine glands, the presence of congenital heart disease, severe chest deformity, multiple abnormalities of the musculoskeletal system, sexual hypoplasia, abnormalities of the gastrointestinal tract, genitourinary anomalies facial area, developmental abnormalities the auditory canal and the structure of the inner ear.<sup>10</sup>

According to the level of mental retardation, Down syndrome can be considered a variant of unpromising mental development, unlike other mental disorders. Thinking in these children has a sign of stiffness and lethargy. In this regard, the speech they have until the end of life remains underdeveloped, often poorly understood by all others.

### STATE OF THE MOTOR SPHERE

At the basis of motor disorders in children with Down syndrome may be deviations associated with this syndrome and with additional health disorders: such as congenital heart defects, impaired vision and hearing.<sup>11</sup>

The main problems that prevent the normal development of the motor sphere of children with Down syndrome are the following:

1. Low muscle tone, which is an important cause of special motor need to develop, inhibiting the formation of movements.
2. The weakness and monotony of reactions aimed at maintaining balance. This leads to stiff movements of the child poorly executed movements associated with turns, lateral flexions and rotation of the body.
3. The difficulty with stabilizing the position of the joints, by reducing the ability to control the muscle tone near the joints and the ability to use these muscles, as well as the excessive elasticity of the ligaments. Children with Down

syndrome have low joint mobility between five and ten years of age.

4. Impaired perception of proprioceptive information affecting the ability to determine the state of one's body, the ability to feel it, to control the body.<sup>5,6</sup>

In the conducted research there was a group of children with Down syndrome of a very early age (from 0 to 3 years), and the task was to scientifically organize a system of their early care, and ensure their participation in sports activities were not set.<sup>12,13</sup>

It was revealed that in Down syndrome there are specific disorders in the motor sphere: difficulty in performing tasks requiring skills of large motor skills, difficulty in performing finely differentiated finger movements and clarity in the arbitrary regulation of movements.<sup>4,15</sup>

The assessment of the physical development of children with Down syndrome and their peers with mild mental retardation, muscular strength (endurance), muscle tone, reaction rate, and characteristics of the nervous system was also evaluated.<sup>16,17</sup> Muscular strength was seen as the ability to contract muscles, while overcoming the load.<sup>18,19</sup> It was found that in children with Down syndrome there is a weakness of the neuromuscular apparatus in all subjects, while in mentally retarded children who do not have Down syndrome, weakness in the neuromuscular apparatus is noted only in three subjects.

The registration of muscle strength was carried out according to the method of "Scale Assessment".<sup>20,21</sup> A six-point scale for its assessment was used<sup>22</sup>:

- 5 points of movement performed in full under the action of gravity with maximum external resistance;
- 4 points - movement in full under the action of gravity and with a small external counteraction;
- 3 points - movement in full under the influence of gravity only;
- 2 points - movement in full in a plane parallel to the ground (movement without overcoming gravity), with a convenient location with an emphasis on a slippery surface;

- 1 point - a feeling of tension when trying an arbitrary movement;
- 0 points - no signs of tension when trying to move arbitrarily.<sup>23</sup>

For a quick diagnosis of muscle strength, the techniques presented in the table were used.

**Table.** Muscle Strength Assessment in Children with Down Syndrome

Parameter	Task to the subject	What was rated
Muscle strength of the hands	As far as possible, squeeze the researcher's two or three fingers first with one and then with the other with a brush	Grip strength of each arm
Muscle strength throughout arms	Squeeze the two fingers of the researcher who tries to free his fingers	The force that the researcher has applied, to free your fingers
Muscle strength of the lower leg and feet	Go on heels and then on toes	Ability to perform a task, Duration of this
Abdominal muscle strength	Sit from a supine position while bent legs in hip and knee joints	Ability to perform a task number of repetitions
Thigh strength	Do a deep squat and then stand up	Ability to perform a task, Number of repetitions
Muscle strength back	Bend forward from a standing position, then straighten, in this case, the researcher prevents straightening by pressing your hand on your head	Ability to perform the task, overcome effort

The findings suggest that children with Down syndrome, unlike their peers with mental retardation, have a decrease in muscle strength of varying degrees, which leads to low physical abilities. In children with Down syndrome, the best result was 3 points (4 children), 5 children scored 2 points each, and 3 children scored 1 point each. Children with mental retardation showed better results: only one test subject had the lowest score. The remaining 18 children - from 4 to 5 points.

The level of muscle tone was significantly reduced in children with Down syndrome: tension and resistance decreased with exercise. Their peers with mental retardation had a high elasticity of muscle tone. This was a sign of imperfection of the neuromuscular apparatus in the examined.<sup>24,25</sup>

The reaction rate (speed) is the time interval between the arrival of the stimulus and the beginning of the muscle response to this stimulus.<sup>26,27</sup> In children with Down syndrome and children with mental retardation, this indicator differed significantly. The number of progressive stimuli in children with Down syndrome is significantly lower than the average indicators, the reaction rate is lower, the ability to respond to the signal is impaired, the ability to distract from extraneous stimuli is reduced, to switch from one activity to another.

### CHARACTERISTIC EMOTIONAL STATE

It is known that in individuals with Down syndrome, the emotional sphere often remains intact.<sup>28</sup> Children with Down syndrome can be affectionate, obedient, benevolent, have great imitative abilities. People with Down syndrome have submissiveness that allows them to adapt well to different life circumstances<sup>29</sup>, affection, sometimes stubbornness<sup>30</sup> and lack of flexibility<sup>31</sup>, a tendency to imitate, a sense of rhythm and love of dancing.<sup>32</sup>

Adults and the social environment play a key role in social adaptation. Mentally retarded children without Down syndrome are fairly freely adapted to society, and they need help from adults only up to a certain age.<sup>33</sup>

These differences are associated with disorders of higher mental functions, the central nervous system and the neuromuscular apparatus, which are still little studied in these children. In individuals with Down syndrome, the level of motivation is sharply reduced, and very often a weak type of nervous system is recorded.

### CONCLUSION

In children with Down syndrome, in contrast to mentally retarded children, polymorphism of manifestations of defects and related

developmental disorders, including locomotor and speech functions, which create significant, is noted. Some similarity of symptoms in mentally retarded people and people with Down syndrome is not a reason to consider these two groups of people as a homogeneous group with a common characteristic. Persons with Down syndrome up to 12 years old are far behind in development. Their intelligence is usually reduced to the level of mental retardation of a moderate degree. Late speech appears, which remains poorly developed throughout life. A child with Down syndrome is more difficult than a child with mental retardation to join the system "environment - person - environment", which prevents his social formation, and adaptation in society. Considering all of the above, we can assume that athletes with mental retardation and athletes with Down syndrome in competitive practice do not lie in the unification into one group due to the strong differences in their psychophysical status.

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