

**EDUCATIONAL AND PHYSICAL CHALLENGES OF SENIOR PRESCHOOLERS  
WITH AUTISM SPECTRUM DISORDERS**

***DESAFIOS EDUCACIONAIS E FÍSICOS DE PRÉ-ESCOLARES SENIORES COM  
DISTÚRBIOS DO ESPECTRO DO AUTISMO***

***DESAFÍOS EDUCATIVOS Y FÍSICOS DE LOS PREESCOLARES MAYORES CON  
TRASTORNOS DEL ESPECTRO DEL AUTISMO***

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**ABSTRACT:** The relevance of the stated problem is confirmed by the increase in the number of children with autism spectrum disorder (ASD), the need for pedagogical support of the effectiveness of their physical and cognitive education during preschool childhood, considering the level of development of motor abilities and personal resources. The aim of the study is to analyze the educational and physical challenges of senior preschoolers with autism spectrum disorders. The research material is the test results of 17 senior preschoolers with ASD (14 boys and three girls) attending compensatory and combined groups of preschool educational institutions No. 12 and 15 in Belgorod. Our study reveals educational and physical problems in children with ASD associated with the development of Cognitive development, balance function, dysregulation of muscle activity, and difficulties with targeting in the performance of movements. Children show reduced arbitrariness, impaired coordination of movements.

**KEYWORDS:** Educational and physical challenges. Cognitive development. Pedagogical support. Preschoolers with ASD.

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**RESUMO:** A relevância do problema apontado é confirmada pelo aumento do número de crianças com transtorno do espectro do autismo (TEA), pela necessidade de suporte pedagógico e pela efetividade de sua educação física e cognitiva na infância pré-escolar, considerando o nível de desenvolvimento das habilidades motoras e recursos pessoais. O objetivo do estudo é analisar os desafios educacionais e físicos de crianças em idade pré-escolar com transtornos do espectro do autismo. O material de pesquisa são os resultados do teste de 17 pré-escolares seniores com TEA (14 meninos e três meninas) que frequentam grupos compensatórios e combinados de instituições educacionais pré-escolares nº 12 e 15 em Belgorod. Nosso estudo revela problemas educacionais e físicos em crianças com TEA associados ao desenvolvimento cognitivo, à função de equilíbrio, à desregulação da atividade muscular e às dificuldades de direcionamento na execução de movimentos. As crianças, então, apresentam arbitrariedade reduzida e coordenação de movimentos prejudicada.

**PALAVRAS-CHAVE:** Desafios educacionais e físicos. Desenvolvimento cognitivo. Apoio pedagógico. Pré-escolares com TEA.

**RESUMEN:** La relevancia del problema planteado se confirma por el aumento en el número de niños con trastorno del espectro autista (TEA), la necesidad de apoyo pedagógico de la efectividad de su educación física y cognitiva durante la niñez preescolar, considerando el nivel de desarrollo de las habilidades motoras. y recursos personales. El objetivo del estudio es analizar los desafíos físicos y educativos de los niños en edad preescolar mayores con trastornos del espectro autista. El material de investigación son los resultados de las pruebas de 17 niños en edad preescolar con TEA (14 niños y tres niñas) que asisten a grupos compensatorios y combinados de las instituciones de educación preescolar No. 12 y 15 en Belgorod. Nuestro estudio revela problemas educativos y físicos en niños con TEA asociados con el desarrollo del desarrollo cognitivo, la función del equilibrio, la desregulación de la actividad muscular y las dificultades con la focalización en la ejecución de los movimientos. Los niños muestran una arbitrariedad reducida, una coordinación de movimientos deteriorada.

**PALABRAS CLAVE:** Desafíos físicos y educativos. Desarrollo cognitivo. Apoyo pedagógico. Niños en edad preescolar con TEA.

## Introduction

Humanization and focus of modern preschool education on creating an inclusive educational environment urges scientists, practitioners, and parents to solve such a problem as meeting the need for affordable and high-quality education considering the child's abilities and personal resources.

The relevance of the problem is confirmed by the increase in the number of children with disabilities. The total number of children with autism spectrum disorder (ASD) at the level of preschool education in the Russian Federation was 8089 people in 2020. The share of

preschoolers in the total number of students with ASD is 24.5% (KHAUSTOV; SHUMSKIKH, 2020).

Modern foreign and domestic studies by O. H. González, X. Wei, A. A. Nesterova, A.V. Khaustov report the need to ensure the integrity of socialization and individualization for children with ASD (KHAUSTOV; SHUMSKIKH, 2020; GONZÁLEZ *et al.*, 2020; WEI *et al.*, 2014; NESTEROVA *et al.*, 2016). The latter experience difficulties in social functioning, such as difficulties with social interaction, adaptation to the preschool institution environment. They have stereotyped and limited interests, increased and/or decreased sensory reactivity, which can manifest itself in atypical behavioral responses such as distraction, aggression, and anxiety (WEI *et al.*, 2014). Scientists have noted a low level of socially-mediated emotional response, changes in communication (delay or complete absence of verbal means of communication, lack of formation of alternative means of communication, functional language), stereotypy and mannerism in behavior (DAKOPOLOS; JAHROMI, 2019; HO *et al.*, 2019; KOEGEL *et al.*, 2012).

Indeed, 88% of SPARK children with ASD are at risk of movement disorders. The relative risk of movement disorders was 22.2 times higher in children with ASD compared to the general child population (BHAT, 2021). It is aggravated by behavioral characteristics, characteristics of social interaction and communication.

A review modern research has revealed the following features in the motor sphere in children with ASD:

- dysregulation of muscle activity, lack of control over motor actions;
- difficulties in the targeting in the performance of movements and spatial orientation;
- problems with mastering the performance technique of basic movements: heavy gait, impulsive run with a dysrhythmia and wide arm span, stereotyped movements, tiptoeing;
- accompanying movements, self-stimulation and stereotypy (PLASKUNOVA, 2012; KRISHTAL, 2018; LANG *et al.*, 2010).

A number of scientists propose to recognize movement disorders as one of the diagnostic criteria or specifiers of ASD (BHAT, 2021; SCHAROUN *et al.*, 2014). Practice shows that reduced voluntariness in autistic children leads, first of all, to impaired coordination of movements, sensorimotor coordination and fine motor skills of the hands (PLASKUNOVA, 2012; KRISHTAL, 2018; LANG *et al.*, 2010). All this negatively affects the level of physical fitness of children. We consider physical fitness as a result of the process of physical training, expressed in a certain level of development of physical qualities (motor abilities), mastering motor skills and abilities.

The report of the Institute for Child Development (University of North Carolina, USA), January 2014, as well as M. Krishtal, R. Lang, M. Sowa, K. Stavrou, A. D. Solomko report the influence of physical activity on positive changes in the behavior of children with ASD (PLASKUNOVA, 2012; KRISHTAL, 2018; SOWA; MEULENBROEK, 2012; STAVROU *et al.*, 2018; SOLOMKO, 2012).

Studies focus on the need to adapt physical activity to the characteristics of children with ASD, develop and implement individual comprehensive correctional educational programs for them, use the potential of team forms of motor activity and sports games as a tool for the socialization of children with ASD. It is emphasized that collective motor-play activity helps to develop various qualities, abilities, and skills of preschoolers with ASD (PLASKUNOVA, 2012; KRISHTAL, 2018; STAVROU *et al.*, 2018; CHUMAKOVA, 2016).

Currently, domestic and foreign scientific reviews and practical guidelines point out the need to search for new pedagogical solutions to the holistic socialization-individualization of children with ASD in motor activity, which requires the study and assessment of their physical fitness (SOLOMKO, 2012; GREENSPAN; WIEDER, 2009; KAHJOOGH *et al.*, 2020; GAVRILUSHKINA; EGOROVA, 2007; GRASHCHENKOVA; LIEBLING, 2021).

## Materials and Methods

The objective was to inspect educational and physical challenges of senior preschoolers with ASD.

To achieve the objective, the following methods were used:

- theoretical: analysis, synthesis, generalization;
- empirical: fitness score tests: standing long jump (cm), 1kg ball throwing (cm), one-leg standing (sec), ball tossing and catching (number of times), 1kg medicine ball throwing behind the neck (cm), endurance run (m);
- mathematical statistics (Student's t-test).

The experimental study involved 17 senior preschoolers with ASD (14 boys and 3 girls) attending compensatory and combined groups of preschool educational institutions No. 12 and 15 in Belgorod. According to the “Regional Resource Center for Children with ASD and Other Mental Disorders” in Belgorod, as of 01.06.2021, the number of preschoolers with ASD in Belgorod is 75 people.

The theoretical and methodological basis for the study and scoring of the physical fitness of children with autism spectrum disorders in motor activity was the fundamental concept of the personality-activity approach of L. S. Vygotskii, A. N. Leontiev, S. L. Rubinshtein and others, that raising a child, including physical fitness, is focused on the development of subjectivity in children's activities, considering personal potential and capabilities (VYGOTSKII, 1983; LEONTIEV, 2005; RUBINSTEIN, 2000).

The following provisions have also been considered:

- theories of the development of children with autism spectrum disorders (DAKOPOLOS; JAHROMI, 2019; LEBEDINSKAIA *et al.*, 1989; HARRIS *et al.*, 1991; MUNDY, 1995; STEFFENBURG *et al.*, 2018; VARNOCK, 2005).

- scientific and theoretical provisions on the relationship and interdependence of physical and mental development (SOWA; MEULENBROEK, 2012; SOLOMKO, 2012; ANOKHIN, 2013; DOMAN, 1996);

- ideas of creating an inclusive educational environment for children with ASD, which are based on the postulate that, regardless of the child's abilities and personal resources, his need for physical activity and full-fledged physical development must be met (NESTEROVA *et al.*, 2016; PLASKUNOVA, 2012; SOLOMKO, 2012; BYSTROVA, 2016).

## Results and Discussion

Fitness score of preschool children with ASD was assessed using tests to study the level of development of physical qualities and motor skills. The peculiarity was the individual diagnostics of each child. Children received special assistance in performing tests (repeated demonstration of the elements of technique, joint performance, assistance, game stimulation, etc.).

Quantitative diagnostic results are presented in Table 1. For the purpose of comparison, the table also shows quantitative indicators for scoring the physical fitness of children with neurotypical development. Let us dwell on the quantitative and qualitative analysis for assessing the level of physical fitness of senior preschoolers with ASD.

**Table 1** – Results of fitness score of senior preschoolers with autism spectrum disorders

Tests	Unit of measurement	Sex	M± m c children with ASD	M± m c children with neurotypical development	t	p
Standing long jump	cm	boys	35.07±8.58	113.6±14.69	4.62	<0.05
		girls	64.00±17.15	108.9±3.41	2.57	<0.05
Medicine ball long-distance throwing	cm	boys	148.57±27.58	157.3±27.35	0.22	>0.05
		girls	120.00±18.37	155.2±16.44	1.43	>0.05
One-leg balancing	sec.	boys	3.64±1.66	29.2±3.12	7.23	<0.05
		girls	3.50±0.18	33.8±4.61	6.57	<0.05
Ball tossing and catching	number of times	boys	17.4±4.35	21.86±8.13	0.48	>0.05
		girls	3.33±4.08	19.8±4.32	2.77	<0.05
Endurance run	distance (m), duration (min)	boys	162.14±42.69	745.42±43.00	<b>9.63</b>	<0.05
		girls	293.33±114.31	770.00±42.64	3.91	<0.05

Source: Devised by the authors

During diagnostic tests of physical fitness all children with ASD, both boys and girls, had difficulties in performance. The preschoolers with ASD could not independently cope with the test task until their teacher shows the performance of movements. Verbal instruction alone was not enough to perform a movement. In addition to demonstrating the way to perform movements by adults, children were also helped by showing the technique of movements by another child.

During the endurance run test, more than half of the children coped with it unassisted. The teacher had to take the rest of the children by the hand and stimulate them to start completing the task, run with the children, set the pace and rhythm of movement. While running, these children showed stereotypical hand movements (flapping), impulsivity and rhythm disturbances.

Preschoolers with autism spectrum disorders had difficulties during Standing long jump in coordinated performance of the elements of technique, control over motor actions, showing a sluggish swing of the arms. Six (35.3%) children could jump and land with only one foot forward (stepping over). When performing this test, preschoolers did not respond to either speech instructions or active promptings.

The results of Medicine ball long-distance throwing indicate violations of sensorimotor coordination. Four (28.5%) boys and 2 (66.6%) girls could not coordinate the swing and throw, dropped the medicine ball instead of throwing it.

Violations of locomotor coordination were most severe during One-leg balancing. Both boys and girls found it difficult to understand the task, concentrate on and repeat the action. Six of 17 children completed the task (35.3%).

During Ball tossing and catching, 10 (71.4%) boys coped with the task, tossed and caught the ball correctly. The rest of the boys and all the girls had difficulties with the quality of performance, i.e., the children threw the ball but could not always catch it, which was caused by spatial disorientation.

Thus, there is a heterogeneity and specificity of the quality and synchronicity of the performance of motor actions by children with autism spectrum disorders.

The comparison of the diagnostic results with the average indicators for children with neurotypical development indicates a significantly limited manifestation of physical qualities and the performance technique of the basic movements in children with ASD. The standing long jump, balancing, and endurance run tests showed significant differences both in girls and boys; while ball tossing and catching showed significant differences only in girls ( $p < 0.05$ ).

Student's t-test showed no significant differences by gender in the indicators of boys and girls with ASD. The empirical value  $t$  is within the range of insignificance ( $p > 0.05$ ).

The data of our study confirm the results of both domestic and foreign studies that children with ASD are characterized not only by cognitive, functional impairments, difficulties in social functioning but also motor problems (PLASKUNOVA, 2012; SOLOMKO, 2012; KOEGEL *et al.*, 2012; BHAT, 2021).

Our study revealed violations of fine and gross motor skills, a retarded development of locomotor functions, manifested in the awkward and limited movements (tension, stiffness), which confirms the results of other studies (BHAT, 2021; PLASKUNOVA, 2012; LANG *et al.*, 2010; SOLOMKO, 2012; TYLER *et al.*, 2014).

## Conclusion

Thus, the physical fitness of children of this nosological group is distinguished by the specific performance of movements, the polarity of the indicators of the development of physical qualities.

Children with ASD have motor disorders, such as impulsive running with an uneven pace, inconsistent hand movements when tossing and catching a ball, single-support repulsion when jumping in a standing long jump test.

The results of our study revealed problems with the development of the balance function in children with ASD. Only 1/3 of preschoolers can maintain vertical balance, measure and regulate their actions in space, performing them freely, without undue stress and stiffness.

The study confirms the relevance and importance of the search for new approaches that ensure the use of the potential of individual and group forms of motor-play activity, as well as the need to study their influence on the effectiveness of the process of physical training of children with ASD.

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