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Evaluation of the adaptive potential of first-graders with normal speech development and speech disorders

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Abstract

The modern Russian school is focused on the active socialization and individualization of children with disabilities. Inclusive education determines the possibility of teaching children with disabilities varying severity in the conditions of primary general education, outside correctional classes. This situation dictates the need to study and assess the adaptation of children with disabilities to learning in a new social role - the role of the student. Psychophysiological adaptation is an important condition for the preservation and strengthening of students' health. Accordingly, the control of the adaptation processes of the body, the state of health, the level and harmony of physical development is a prerequisite for the development of a system for diagnosing and correcting maladaptive states. The objective of our research was to evaluate and compare the results of the study of physical development, somatic health, and adaptive capabilities of younger students with normal speech development and speech disorders during entering the school. The physical development of students was assessed using the somatometric, somatoscopic, and physiometric methods. The adaptive potential of the body was measured by R.M. Baevsky's method. Somatic health levels were determined by Apanasenko's method. Speech development was evaluated according to the test method for diagnosing oral speech by Fotekova, attitude to school and emotional background - by Orekhova's test. Based on the analysis of the results of this examination, the students were divided into 2 groups: #1 - with normal speech development, #2 - with speech disorder. It was established that physical development in 67% of younger schoolchildren with normal speech development and 75% with speech disorders is either disharmonious or sharply disharmonious. Somatic health levels in 73% of primary school students are low, 21% are below average, the process of adaptation of children to new living conditions is characterized by the stress of physiological mechanisms and is often carried out at the expense of functional reserves, which is especially typical of children with speech disorders.

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Disproportionate physical development, low level of somatic health and unfavorable adaptation are caused, apparently, by a number of factors, the first of which is the lack of physical activity of children..

Keywords: adaptative potential, physical activity, misadaptation, health, stress, body functionality, inclusive education, speech disorders, elementary school;

1. Introduction

The beginning of the school life is accompanied by significant changes in the organization of children's living space: the lifestyle and the daily routine change, the sphere of communication expands, and the mental and physical stress increase. All this leads to a violation of the processes of adaptation to school, negatively affects the psycho-emotional state of first-graders and their health (Hayes, O'Shea, Foley-Nolan, McCarthy & Harrington, 2019; Burns & Rapee, 2019).

Reading is the most important skills in life. Although comprehension is the most important part of this process, reading fluently is necessary for comprehension. Reading fluency is characterised by reading accurately, automatically and prosodically, and with expression (Kuhn, Schwanenflugel & Meisinger, 2010). When the reading characteristics of students with problems in the reading fluency dimension are examined, it is seen that these students' reading rate and reading accuracy are lower than their peers (Ceylan & Baydik, 2018).

Many authors have pointed to the deterioration of the adaptation mechanisms of first graders at the beginning of the school year. For example, Pogrebnyak (2015), found that 80% of boys and 71% of girls have the low adaptive potential.

Language is an individual phenomenon of a physiological and psychological nature, conditioned, of course, by the social existence of the individual. Both the lexical, semantic, and grammatical sides are accomplished through all the activities and factors adjacent to the instructive-educational process (Ciobanu, 2018). Many researchers attribute deterioration of children's health to a decrease in their physical activity, which is an essential condition for a child's normal physical and mental development. The optimal motor regimen improves the physiological functions of a growing organism and upgrades the indices of its physical fitness (Estevan, García-Massó, Molina García, & Barnett, 2019; Demetriou, Reimers, Alesi, Scifo, Borrego, Monteiro & Kelso, 2019; Peralta, Mhrshahi, Bellew, Reece, & Hardy, 2019; Shriberg, Kwiatkowski & Mabie, 2019).

Physical development characterizes the processes of growth and development of the child and is an integral indicator reflecting the state of health of the child's body. The process of their adaptation to school depends on the level and, especially, on the degree of harmony of the child's physical development. According to Khuzikhanov, & Mukhametdinova, (2018), about a quarter of first-grade boys and girls have low rates of physical development. 20% of children have disharmonious physical development. The trend towards an increase in the number of children with sharply disharmonious development was also noted by Tyumaseva, Orekhova, Valeeva, Salamatov and Kalugina, (2018).

In modern Russian schools, a large group consists of children with speech disorders. According to the latest data, the number of such children has increased by 59.8% over the past 5 years. Speech development is a key component in preparing a child for school. Without a certain level of speech development, schooling is not just difficult, but almost impossible. According to some data, speech disorders in children are accompanied by movement disorders. Often discoordination, slowness, disinhibition, and inaccuracy of movements adversely affect the child's adaptive abilities (De Paepe, Dochy, Willems, Van Hoecke & De Leenheer, 2019; Klimova, 2016).

1.1. The objective of our research

The objective of our research was to evaluate and compare the results of the study of physical development, somatic health, and adaptive capabilities of younger students with normal speech

development and speech disorders during entering the school. It is expected to set an example for other studies

2. Research methods

The experiment was conducted on the basis of the Lyceum No.10 in Belgorod. It involved 255 first-graders of primary school, 130 boys and 125 girls of them were grouped as follows: first-graders with normal speech development (#1) with and speech disorders (#2) according to the results of an examination of speech development by Fotekova’s method (Buslovskaya, and Yurchenko, 2012).

The physical development of children was assessed on the main somatometric, somatoscopic, and physiometric parameters. The assessment of the level of physical development and its harmony was carried out according to the centile evaluation tables and the development profile, subject to the sigmatic deviations of individual signs. Levels of somatic health were assessed based on the analysis of the state of the main body systems after gradual functional test according to Apanasenko. Speech development was evaluated according to the test method for diagnosing oral speech by Fotekova attitude to school and emotional background - by Orekhova’s test. To assess the functional adaptive reactions of the organism, the adaptive potential was calculated according to (Buslovskaya and Yurchenko, 2012). The significance of differences was assessed by Student t-test.

3. Empirical results

The analysis of students' medical records and our research showed that 37% of first-graders who participated in the study had abnormalities in speech development. At the same time, they were distributed as follows: 13% had a phonetically underdeveloped speech; 76% had phonetic-phonemic disorders; and 11% - general speech underdevelopment.

The results of somatometric and somatoscopic examinations showed that the average values of growth, body weight, chest circumference, degree of muscle development, fat deposition, hand strength, lung capacity, power and vital indices in both boys and girls corresponded age norms, with no significant differences between groups #1 and #2 identified (Table 1, 2).

Table 1. Anthropometric parameters of the boys

Parameters		Groups	
		1	2
Height, cm		125.6±0.9	124.2±2.2
Body weight, kg		25.9±0.9	26.9±1.9
Chest circumference, cm	Inhale	69.1±1.1	69.7±0.8
	Exhale	63.9±0.8	64.9±1.1
	Pause	67.1±0.9	67.9±0.9

Table 2 Anthropometric parameters of the girls

Parameters		Groups	
		1	2
Height, cm		125.9±1.6	124.9±1.9
Body weight, kg		27.1±1.8	26.8±2.6
Chest circumference, cm	Inhale	65.7±0.5	66.1±0.9
	Exhale	62.9±0.9	63.1±0.5

cm	Pause	65.1±0.8	65.3±0.9
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Weight-growth, life, and power indices were calculated. The potential functionality of the respiratory system was evaluated by calculating the vital index (VI). In our studies, most of the first graders of the control group had this parameter consistent with average values. Boys with speech disorders had their VI slightly lower than the norm, characteristic for this age. A decrease in VI may indicate a deterioration in the functional capabilities of the respiratory system and indicates stress in the respiratory function of the lungs during intensive growth and development.

Overweight or underweight in young schoolchildren with speech disorders was determined by the weight-height index (WHI). It was established that 14% of students without speech disorders and 22% of first-graders with speech disorders had a weight loss. 1% of children with speech disorders had overweight.

The strength endurance index is one of the important criteria for assessing physical development. In order to determine the degree of development of the strength of individual muscle groups relative to body weight, the power index (PI) was calculated. It was established that PI of first-graders of both groups corresponded to the age-related norms. Second-graders of both groups had mostly medium VI, WHI, and PI.

48% of first-grade boys and girls had their Robinson index (RI) average and below average, in 15% of children it was low, and in 37% it was high. Low Robinson index in children suggests increased fatigue and reduced adaptive capacity.

Children with speech disorders also showed a decrease in the Rufier index by 9.5% compared with the same parameter in children of the control group. In addition, they coped worse with Stange's tests: the result of the group with speech disorders was lower by 14%, and for Genchi - by 15%.

Physical development serves as an important criterion characterizing the health of a growing child, reflecting among all the process of adaptation to school. Our studies found that the level of physical development corresponding to the norm (the average statistical values of this sex and age group) was characteristic of 25% of first-grade boys of the control group and 18% of boys with speech disorders. 41% of the surveyed students had a high level of physical development, these boys were 11% more in the control group (without speech disorders). 6% of boys in the control group had a low and below average level of physical development. The group of boys with speech disorders, having such levels of physical development, had 6% more.

First-grade girls with a medium level of physical development were 36% in the control group and 40% in the group with speech disorders. The high level was characteristic for 59.5 for the control group and 60% of girls for the group with speech disorders.

The harmony (proportionality) of the physical development of primary school students was determined by the developmental profile, subject to the sigmatic deviations of individual characteristics for boys and girls. We singled out harmonious, disharmonious, and sharply disharmonious physical development.

Analysis of the growth and weight indicators found that a sharply disharmonious development is characteristic of most first-graders. In the group of boys without speech abnormalities, such children were 77%, in the group of children with speech disorders - 86%. Sharply disharmonious development was determined in 57% of girls in the group with speech underdevelopment and in 64% of girls with impaired speech function.

During the study, the somatic health of schoolchildren was determined on the basis of studying and analyzing the functional state of the main systems of the body after gradual physical exercise. It was revealed that 68% of all surveyed boys and girls without speech disorders are characterized by low somatic health; for children of the group with speech disorders, the indicator was 10% more. 22%

of the respondents of the control group had the level of health below the average; analyzing the results of the group with speech disorders, we can note that the level of health below the average was found 8% less. 7% of girls had a medium level of somatic health.

Thus, most first-grade girls and boys had a low level of somatic health.

One of the indicators of the first grader's adaptation process is the predominant type of mood and emotional background. We found that in both groups 46% of children had a normal emotional state. 36% of children with speech disorders had negative emotions, unpleasant experiences, and bad mood. In the control group, these children turned out to be 13% less. Positive emotions were found in 37% of students in group #1, while in group #2 such children were 25% less. At the same time, the mean values of emotional state assessments in group #1 were 14.8 ± 0.09 , and in group #2 - $21.1 \pm 1.3^{***}$ ($p < 0.001$). Thus, the first graders of the control group had an emotional state better than the first graders of the study group. The results obtained coincide with studies by Gracheva, who found that 74% of schoolchildren with speech disorders usually have symptoms of psychoemotional stress (Khuzikhanov & Mukhametdinova, 2018).

When characterizing the process of adaptation of schoolchildren at the initial stage of education, their psycho-emotional state, the presence of frustration states, attitudes towards school, school subjects, teachers, and classmates must be considered. Studies have shown that more than 50% of first-graders without speech disorders have a positive attitude towards school, while most first-graders of the study group have a negative attitude. This is reflected in the reluctance to go to school, to communicate with their peers and teachers. A small number of children in both groups had an ambivalent attitude toward school. That is, students of the control group have a better attitude toward school than students with speech disorders. Gracheva (2009) also focused on the fact that students with speech disorders have a negative attitude toward the school. At the same time, among schoolchildren without speech pathology, productive emotional attitudes toward learning were noted in 44% of children.

The adaptive potential (AP) is the most important physiological indicator of the organism's adaptability to environmental factors; it is achieved by a set of functional changes in the physiological systems of the body, primarily the cardiovascular one. Adaptive abilities of the body of children were assessed according to the degree of stress of the adaptation mechanisms based on the value of the adaptation potential. There was a satisfactory adaptation with enough functionality of the body; stress adaptation mechanisms in which the functionality is provided by functional reserves; unsatisfactory adaptation and failure to adapt with a sharp decrease in the functional capabilities of the organism.

Our studies showed that at the beginning of the school year the number of children with the stress of adaptation mechanisms averaged 18.5% in the control group, among which children with speech disorders were 27%. At the same time, the adaptive potentials of the body of girls and, especially of boys, with speech disorders, were significantly lower, at $p \leq 0.05$.

4. Discussion

According to De Paepe, (2019), speech pathologies significantly affect the life and health of children; it was shown that 1 of 5 students with similar deviations experienced behavioral difficulties, problems of socialization, and learning difficulties (De Paepe, Dochy, Willems, Van Hoecke & De Leenheer, 2019). Our studies also found that most students with speech disorders have a reduced emotional background and a negative attitude toward school. Shalimov, (2019), found in his studies that children with speech disorders have a high level of anxiety and attention deficit (Shalimov, Suvorinova & Nesterovsky, 2019).

The literature provides evidence that children with speech disorders have a lower level of somatic health. The studies by Klimova, (2016), show that children of this group have a higher incidence of acute respiratory viral infections, pyelonephritis, and allergic reactions, which are characterized by a

reduced immune status. In general, comparing the performance of children with the normal speech development and with the general underdevelopment of speech, we can state that the latter, due to objective reasons, constantly experience stress, which negatively affects both the physical and psychological health of the child.

The literature review revealed sex-related differences in adaptation, the health status of children with deviations in speech function. Shestakova, Chizhova, Ermasheva & Vishnevskaya, (2017), found that boys with speech developmental defects are more likely to suffer from chronic comorbidities, less well adapted to the learning process, have more significant impairments in their psycho-emotional status, have 2 times more often diseases of the central nervous, musculoskeletal, and cardiovascular systems, ENT organs, and digestive pathologies. Our research also suggests that boys with speech disorders usually have a decrease in adaptive capacity, a low level of somatic health, and deviations in physical development. Iuliana & Eugeniu, (2017) analysing each dimension of the message, speech therapists note that the autistic children often display deficiencies at the morphological and syntactic levels (they incorrectly use verbal tenses morphemes); at the semantic level (they fail in making up sentences which include multiple significance of some words).

Foreign and domestic studies note that speech impairment in childhood requires timely correction and comprehensive support, the assistance of neurologists, psychiatrists, orthopedists, cardiologists, otolaryngologists, gastroenterologists, speech therapists, and pathologists under the supervision of a pediatric service (De Paepe, Dochy, Willems, Van Hoecke, & De Leenheer, 2019; 10. Klimova, 2016; Shalimov, Suvorinova, & Nesterovsky, 2019; Shestakova, Chizhova, Ermasheva, & Vishnevskaya, 2017). The problem of developing and implementing programs of psychological and pedagogical support for students with speech disorders in inclusive education is particularly relevant.

5. Conclusion

Thus, it was established that physical development in 67% of younger schoolchildren with normal speech development and 75% with speech disorders is either disharmonious or sharply disharmonious; somatic health levels in 68% of primary school students of group 1 and 78% of group 2 are low, the process of adaptation of children to new living conditions is characterized by stress of physiological mechanisms and is often carried out at the expense of functional reserves, which is especially typical of children of study groups with speech disorders. Disproportionate physical development, low level of somatic health and unfavorable adaptation are caused, apparently, by a number of factors, the first of which is the lack of physical activity of children. Correlation analysis of the adaptive potential and motor activity will be conducted in the short term.

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