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Level-balanced psychomotor support program for preschool children with Intellectual Disabilities

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Abstract

The article deals with applying a level-balanced psychomotor support program, appropriate to the levels of motor development of preschool children with intellectual disabilities and that could improve the orientation and research abilities of the aforementioned subjects. Applying a level-balanced psychomotor support system to children of preschool age with intellectual impairments could create the favorable conditions for the realization of the individually preserved capabilities of motor management and intellectual development. The central core of the psychomotor development of children with intellectual impairments is the ability to restructure the acquired movements and actions as well as the individual recovery of the children's emotional disorders, orientation and research abilities. It has been empirically proven that the use of a level-balanced psychomotor support program optimizes the psychomotor activity and improves the psychomotor capacity of preschoolers with intellectual impairments. These conditions allow a child's individually preserved physical health to be involved in the realization of motor function.

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1. Introduction

1.1. Relevant scientific research and analysis of issues

In modern psychological literature, there are a number of research works that have dealt with the problem of the systematization and complex analysis of child development.

Piaget (1927) made a significant contribution to the state of modern psychological science. Psychologists and pedagogues worldwide still apply his research findings in the field of child psychology, i.e., the features of children's speech and causal reasoning, the way in which children live and interpret their daily events and/or the moral and natural phenomena surrounding them. In the research conducted between 1921-1924, Piaget drew some conclusions concerning children's innate egocentrism and their gradual socialization while communicating with adults. In his opinion, we should not investigate social life in connection with the mind; instead, we should direct our efforts on social relationships. Piaget added the psychological factor in the context of these relationships, that is, the level of intellectual development of the individuals who interact.

As demonstrated by Vallon in his thesis "Stages and impairments of psychomotor and motor development of a child" (1967), the mental activity of a child is based on the idea of the gradual development of a child's mind. Certain stages of this development are characterized by the domination of the affective sphere over the rational sphere, while other stages show the primacy of intelligence over emotions. There is thus a gap and even a competition between the rational and emotional spheres that determine the development of a child's personality.

Bernshtein (1991), the founder of a new direction in science, i.e. the physiology of action, investigated deeply and partially described this issue. He was the first to describe and to demonstrate the hypothesis of action based on the assumption that, to make a movement, the brain must not only send commands to the muscles but it must also receive signals from the peripheral senses and give new "commands", based on the signals received. Thus, in a process of building the movements, there is not only a direct but also inverse connection between the brain and the peripheral nervous system.

Zaporozhets published a monograph "The development of arbitrary movements" (1960), which described a study of different types of movement habits as a model of mastering skills and new types of behavior in

preschoolers. This paper gave a significant contribution to the psychological theory of action construction. It also included some sections from the previously published paper entitled "Rehabilitation of Movements" (Leontiev & Zaporozhets, 1945).

Bachman (1961) made important conclusions concerning the tight connection of motor activity with three aspects of health (physical, mental, and social) and concerning the different roles played by motor activity throughout life. In his opinion, in childhood, motor activity provides the typical development of a body. It is during development that the body is most sensitive to the effects of adverse environmental factors, including restraints in motor activity, which are common for children with intellectual impairments.

The research of Vilchkovsky (1983) showed that the formation of preschooler's motor skills depends on three main group factors: genetically-determined motor inducements, the arbitrary motor activity of a child (that depends on the implementation of many movements in everyday life), and the particularly organized pedagogical influence, which stimulates the natural course of ontogenetic development of motor activity.

Lockman and Thelen (1993) also found the link of the interaction among the motor, cognitive and emotional manifestations of the mind. Understanding this psychomotor interaction could be especially important to study mental retardation as a pedagogical problem. The need for movement, especially in children, is considered one of the most important body features, which plays a significant role in the normal functioning and vital activity of the body of a human being. At all stages of the evolutionary process, the development of a human being takes place in close connection with its muscular activity, which can be considered one of the main factors ensuring the optimal stability of the internal environment of the organism and its activity in relation to environmental changes.

Wallace and Goldstein (1994) proved that the accuracy of movements is influenced by the individual-typological qualities of the nervous system, the intensity zone of the measured parameters, the possible damage to the nervous system as well as the critical periods of psychomotor development.

Another scientist working on this issue was Sally Goddard Blythe, who conducted research on the effects of neurological dysfunction in specific learning difficulties and proposed effective remedial programs. She was the author of the "Reflexes Learning and Behavior" (2005) as well as numerous other research papers and articles. The "Well Balanced Child" (2004) was a passionate manifesto for a "whole body" approach to learning, which

integrated the brain, senses, movement, and play. This fully revised edition included a new chapter with a story and movement exercises that parents could use to help children reach their potential in motility.

Practical experience and theoretical research both allow us to state that all children with intellectual impairments, regardless of the specialties of psychomotor underdevelopment and of the level of the stable organic violation in the cognitive activity, meet huge difficulties in performing tasks that need the implementation of changes in movements and actions that have already been mastered. As the ability to change and improve actions that are already mastered depends on the children's abilities to differentiate the movements of the senses (that is the subject of psychology), on the individual features of the localization of the central nervous system's damage (that is the subject of physiology) and on the technologies used in pedagogical actions, psychomotor impairments should be adjusted in accordance with all the factors mentioned above.

Nowadays, focused and effective programs for the support of psychomotor abilities of children with intellectual disorders are still lacking.

The aim of this research paper was therefore to characterize the application of the level-balanced psychomotor support in children with intellectual disorders aged 6-7 years, using a level-balanced approach to the construction of movements and studying an orientation activity of the mind.

2. Methods

2.1. Participants and procedure

We aimed to examine the efficiency of a level-balanced program of psychomotor support for 6-7 year old children with intellectual impairments from an empirical point of view based on the research findings of Simko (2012). As described by the aforementioned author, the program includes four levels. Level A is the evaluation of the coordination in psychomotor potential of preschool children with intellectual impairments at the spinal level. Level B consists in the three-meters walking test with eyes closed, eliminating "the reference" of movements to the environment. Level C is the diagnostic determination in coordination potential of a child at the pyramidal and striatal level. Level D, finally, is the application of the "mounting-dismounting" manipulative test at the parietal and premotor level, the performance of which requires finger dexterity consisting of two-hand manipulations on objects of daily use.

The implementation of a level-balanced psychomotor support for children with intellectual impairments was carried out in three main stages: preparatory, main, and final.

The preparatory stage included the complex definition of the psychomotor development of children with intellectual impairments at different levels of the construction of movements, the development of goals, tasks, and strategies of the supportive therapy, the planning of work in forming the so-called "school" of movements at the levels involved in their construction as well as the arrangement of the necessary materials and technical basis to carry out the supportive classes.

The main stage included the direct implementation of a level-balanced psychomotor support in accordance with the structural and functional components of the model of psychomotor support of children with intellectual impairments in terms of the construction of movements. The structural and functional model of support of psychomotor abilities is a time-determined sequence of actions indicating functional relationships between different levels. In the main stage this program includes a set of physical exercises and mobile games that provide the content of the impact on the psychomotor skills supporting them.

The final stage of the program consisted in the consolidation of the positive changes in psychomotor development of children with intellectual impairments and the transfer of these changes into different activities. Our research revealed that the most effective influence on the psychomotor support of preschoolers with intellectual disorders is not given by isolated exercises but rather by complex exercises in which children were found to resort to compensatory ways of motor control.

A total of 65 children with intellectual impairments of older preschool age (experimental group) was involved in the study and recruited from the Kamyanets-Podilsky Specialized Preschool Educational Institution (Ukraine) and from the Kryvyi Rih Orphanage Kindergarten for Kids with Special Needs (Ukraine). Gender differences were not taken into account during the experiment. The importance of this correctional program was in its impact on the psychomotor development of children with intellectual disabilities.

Before the experiment, the difference between the arithmetic means was statistically significant $p < .01$. After the experiment, the difference between the arithmetic means was statistically significant $p < .05$.

Before applying the experimental program and following its approbation, five specifically trained experts, with the appropriate academic background

(obtainment of a PhD, Master, etc.) and practical expertise (5+ years of experience of work with children with intellectual impairments), estimated the psychomotor skills of the children under examination in interactive, labor, design, art, and speech activities by applying a 12-point scale (see Tab. 1 for more details).

Table 1 – *Dynamics of indicators of psychomotor skills in different types of activities (interactive, labor, design, art, speech) of children with intellectual disorders aged 6-7 years (experimental group) during the 16 weeks of the supportive classes (n = 65)*

Kinds of activity	Quantitative characteristics of growth (M ± m)		
	Before the experiment	After the experiment	Difference
Interactive	1.1 ± .05	.7 ± .04	.4 ± .02
Labor	1.0 ± .04	.7 ± .03	.3 ± .01
Design	1.3 ± .06	.6 ± .03	.7 ± .04
Art	.9 ± .04	.5 ± .02	.4 ± .02
Speech	1.4 ± .07	.8 ± .04	.6 ± .03

Methods of correction of psychomotor skills of children with intellectual disabilities of preschool age should provide effects on all the levels of movement. In addition, in the conditions of corrective actions in the group, such as in physical education classes, the volume of exercises for which children conduct different levels of construction of movements should be approximately the same. In this way, the relatively balanced technique will create favorable conditions for the correction of psychomotor skills of all the children in the group with individually unique damage to the central nervous system.

The use of the level-balanced program during the 16 weeks of the supportive classes (three per week) caused some changes in the indicators of psychomotor skills in the various activities.

3. Results and discussion

Preschool age is the main stage of the formation of an arbitrary motor function in children, which is ensured by the morphological maturation and the development of functional capabilities of the central and peripheral parts of the motor analyzer, as mentioned by Arkin (1968). It allows to provide an

effective supportive therapy of a child's psychomotor system in this developmental period.

Before applying the program, the manifestation of children's psychomotor capabilities in the interactive activity was 6.0 ± .30 points, which grew to 7.1 ± .25 points following 16 weeks of training (see Tab. 1). The difference between the arithmetic means was statistically significant ($p < .01$).

The health and performance of preschoolers with violations in the intellectual sphere in many cases depends on the development of their motor skills. An optimal level-balanced motor activity strengthens the health and promotes the diversified development of a child, in particular, by improving the management of self-service labor activities. Prior to the application of the correctional program, the psychomotor skills of the subjects under study in their labor activities were estimated at 5.7 ± .22 points, while after the supportive therapy at 6.7 ± .28 points, a difference that was statistically significant ($p < .01$).

Physical exercises also have a certain impact on the intellectual sphere of children. Sechenov (1947) noted that the muscular movements of a child favorably affect the development of its brain. Lesgaft (1952) pointed out that, by using physical exercises, we can influence the intellectual development of children. Vallon (1967) emphasized the relationship between motor and intellectual skills of a child. Here we found that psychomotor skills in design in children with intellectual impairments aged 6-7 years increased from 6.5 ± .29 to 7.8 ± .31 points after 16 weeks of supportive exercises with a level-balanced program (see Tab. 1). The difference between the arithmetic means was again statistically significant ($p < .01$).

The support and improvement of skills in actions guided by the different levels leading to the construction of movements are also associated with the development of the qualitative aspects of the motor activity of a child with intellectual impairments. The assimilation of certain actions of the level-balanced support by preschoolers was accompanied by the significant development of their psychomotor skills in the art activities (from 5.5 ± .26 points before the supportive therapy to 6.4 ± .30 points following the therapy, $p < .05$; see Tab. 1 for more details).

The need of particular attention was given to the development of speech skills, where, to a large extent, successful intellectual development depends on. The development of speech in children with intellectual impairments is possible only with the systematic execution of appropriate exercises with a

gradual increase in the level of their complexity. We found that after 16 weeks of applying the level-balanced psychomotor support on the first four levels (A-D), the speech skills at the fifth level (E) increased from 5.4 ± .32 to 6.8 ± .33 points. The difference between the arithmetic means was statistically significant $p < .01$. In other words, we observed a significant increase in the children's speech skills on a level that was not specifically adjusted. We can explain this with the fact that children with intellectual impairments have a weakened health, they get tired quickly, and thus do not execute their speech function effectively. The support of the coordination of movements, with the help of the level-balanced program, improves the general psychomotor abilities of children with intellectual impairments and thus creates the conditions for the improvement in the conduction of speech.

Motor activity restrictions deconditioning the body, with the exception of the important motor-visceral reflexes, lead to a violation in the metabolic processes and to significant changes in the functions and reserves of the internal organs and systems. The optimization of psychomotor activity, on the contrary, contributes to the growth of a child's psychophysical forces (Shynkariyuk, 2005).

When planning and organizing the motor activity of children with intellectual impairments, we adhered to certain requirements in the selection of physical exercises, games, and forms of entertainment, by choosing physical exercises of small- and medium-intensity having a certain corrective direction, which depended on the leading level of the construction of movements. We exposed children to a variety of exercises, also taking care of their attractiveness and playful nature, and involved different groups of muscles, depending on the content and nature of the performance.

The development of psychomotor functions in a child is determined by its motor regime in the family too. The more time children spend on motor activity during their daily routine, the healthier they are and the more they improve in physical development and psychomotor readiness. All the children of our dataset were in approximately the same family conditions.

By developing the motor function in preschoolers with intellectual impairments, we also combined the support, the dynamics of the formation of motor skills, and the development of psychomotor qualities.

The use of the level-balanced program during the 16 weeks of classes caused certain changes in the indicators of psychomotor readiness in the natural actions (see Tab. 2 for more details).

Table 2 – *Dynamics of indicators of psychomotor readiness in the natural actions of children with intellectual disorders aged 6-7 years (experimental group) during the 16 weeks of training (n = 65)*

Indicators (units of measure)	Quantitative characteristics of growth ($M \pm m$)		
	Before the experiment	After the experiment	Difference
Running 10 m at speed (s)	.3 ± .02	.2 ± .01	.1 ± .01
Long jump range (cm)	6 ± .12	5 ± .11	1 ± .02
Throwing bags with sand on a range (m)	.89 ± .03	.61 ± .02	.28 ± .01

Preschoolers with intellectual impairments have in common the fact that they all need an early detection of their psychomotor abilities and a systemic support to prepare for daily life and study. Timely support of psychomotor development is aimed at the maximum possible overcoming of a child's violations.

The correctional impact on children with intellectual impairments in our study was carried out on the basis of a number of methodological principles: consequence, differentiation, individual approach to the child, etc. This is especially important when supporting such psychomotor qualities as strength, speed, endurance, and dexterity.

Psychomotor development is a complex dialectical process characterized by a concrete sequence, the uneven maturation of certain functions as well as their qualitative transformation at a new age stage. At the same time, each further stage of development is inextricably linked with the previous one (Shynkariyuk, 2002).

In the exercise “Running 10 m at speed”, the average result of the group before the correction was 3.6 ± .06 s, while following the correction it became 3.3 ± .07 s, a difference that was statistically significant ($p < .01$; see also Tab. 2 for details). Such a significant increase in the speed of movements can be explained, on the one hand, by the influence of the level-balanced psychomotor support, and, on the other hand, by the fact that children of this age are sensitive to increasing the frequency of steps.

Observations prove that children with intellectual impairments are lagging behind in their development. This is due not only to the peculiarities of the damage to their central nervous system influenced by various environmental factors but also to the delivery of the correct diagnosis and beginning of the supportive therapy, which are not always timely.

Violations of psychomotor development have different dynamics. Along with the persistent deviations in the development due to organic brain damage, there are many so-called inverse variants that arise with mild cerebral dysfunction, somatic weakening, pedagogical neglect, and emotional deprivation.

These deviations can be completely overcome in case of a well-timed support. The dynamics of growth of psychomotor qualities in the process of supportive work is also different. For example, under the influence of the supportive therapy here proposed, the results in the "Long jump" increased from 84 ± 1.81 cm to 90 ± 1.53 cm, which was slightly less than in the exercise "Running 10 m at speed" but still statistically significant ($p < .05$; Tab. 2).

Regardless of the peculiarities of motor underdevelopment, preschool age children with intellectual disabilities all slightly improved in the practice of "Throwing bags with sand at a range" after our level-balanced support. The average result of the investigated group before the supportive therapy was 7.72 ± .25 m, while it became 8.61 ± .24 m following the therapy. The differences between arithmetic means were again statistically significant ($p < .05$).

Since the ability to move away from a movement, once it is learned and mastered, is based on the orientation and research skills of the psychomotor system of the subject, it is peculiar to the individual and the results obtained by children can be very different. The goal-oriented support of the ability to change one's psychomotor stereotypes and the formation of effective orientation and research movements in children occurs not only in the application of the level-balanced program, but also in the process of carrying out the investigated natural actions. However, the task of improving the ability to differentiate movements is rather complicated and requires defining the appropriate psychological and pedagogical principles of this work. Therefore, a level-balanced approach, in our opinion, was effective in reaching the aforementioned goal.

To conduct this study, we were inspired by the position and discoveries of Bernshtein (1991) who considered the system of mechanisms for the management of the psychomotor system as a complex hierarchical formation composed of a number of levels of construction of movements. Therefore, the violation of the motor function in children with intellectual impairments is a consequence of the damage to the corresponding cerebral systems and orientation-and-research activities. We thus recorded the indicators of psychomotor skills in preschoolers with intellectual impairments at different

levels of construction of movements and investigated the possibility to apply a level-based program as supportive therapy (Tab. 3).

Table 3 – *Dynamics of indicators of psychomotor skills at different levels of construction of movements in children with intellectual impairments aged 6-7 years (experimental group) during the 16 weeks of supportive classes (n = 65)*

Indicators (units of measure)	Quantitative characteristics of growth (M ± m)		
	Before the experiment	After the experiment	Difference
Duration of balancing on one leg (s)	1.61 ± .18	.31 ± .04	.30 ± .03
Duration of balancing on two legs located one after another (s)	3.71 ± .16	1.12 ± .05	2.59 ± .03
Accuracy of the simulation of the 7-meter walking test (cm)	8.2 ± .81	1.9 ± .18	6.3 ± .14
Accuracy of the simulation of the 3-meter walking test (cm)	3.4 ± .28	.8 ± .07	2.6 ± .22
Accuracy of a long jump at 75% of max (cm)	1.49 ± .13	.25 ± .02	1.24 ± .11
Accuracy of a long jump at 50% of max (cm)	1.19 ± .12	.27 ± .03	.92 ± .10
Speed of "mounting" operation (s)	16.08 ± .67	11.12 ± .44	4.96 ± .19
Speed of "demounting" operation (s)	12.18 ± .65	6.48 ± .34	5.7 ± .30

We found that the use of supportive exercises to maintain certain positions with smooth but tangible changes in the kinematic and dynamic characteristics of psychomotor actions during the 16 weeks improved the coordination skills of preschoolers with intellectual impairments at the level of paleokinetic regulations. More specifically, the "Duration of balancing on one leg" significantly increased from 3.90 ± .41 s to 5.51 ± .34 s ($p < .01$; see Tab. 3 for more details). This is explained by the fact that exercises like the "Bumblebee", "Cranberry", "Butterfly", "Mill" represent a certain "school" in the control of movements for which the rubrospinal level is leading. Children master the skill to change the muscular tension, which is needed to hold different static positions, to differentiate their muscular tension. In children with an excessive muscular stiffness before the correction, the movements gained signs of alternation of stress and relaxation. In contrast, in children who experienced an excessive relaxation

of the muscles of the neck, trunk, and extremities before the supportive therapy, the movements were more dynamic and the muscle tone slightly increased. In other words, the muscle tone improved when performing psychomotor actions.

The "Duration of balancing on two legs" located one after another was also shown to increase significantly (Tab. 3). Before the experiment, this indicator was equal to 12.59 ± .62 s, while following the supportive classes it rose to 16.31 ± .53 s, a difference that was statistically significant ($p <$ .001). In this exercise, the children showed better results and the conditions for its implementation allowed them to hold the balance for a longer period. At the same time, the relative improvement of the result was also greater than in the previous exercise. This can be explained by the fact that, in our opinion, children with persistent organic violations of cognitive activity could preserve information concerning the work of their muscles in feelings and perceptions for a longer time. In other words, the sensory-perceptual system had more time for self-improvement.

The supportive exercises at level A allowed children to improve the management of muscle tone and muscle excitability according to the functionalities of the nervous system that were saved individually. The supportive tasks stimulated the preserved functions of children with intellectual disorders so that their bodies became active purposeful systems and they themselves became subjects of psychomotor activity.

The supportive tasks for the control of muscle tone and muscle excitability stand on the principle of the ring regulation of movements based on inverse relationships. The nervous system does not only give the efferent orders to the muscles but also receives afferent information from the analyzers regarding the results of their execution. A moderate variation of movements "teaches" the nervous system to change them with the aim to overcome the differences between the real and desirable characteristics of the movements. After all, the rubrospinal level of paleokinetic regulation receives a proprioceptive afferentation concerning the magnitude and direction of muscle tension, and the strength and direction of muscle pressure, which makes it possible to determine the body's position regarding the earth gravity and the location of the parts of the body.

As a consequence, at level A, the psychomotor problems for the acceptance and preservation of poses were solved and the exercises we chose contributed to improving the management of this class of semantic tasks.

In our dataset, we found that the implementation of the level-balanced psychomotor support during 16 weeks also allowed to improve the psychomotor skills of children with intellectual impairments aged 6-7 years at the thalamic pallidum level of synergies, which is the level of common movements and standard stamps. More specifically, before the experiment, the "Accuracy of the simulation of walking at 7 meters" without visual control was 26.2 ± 2.05 cm, which became 18.0 ± 1.97 cm following the experiment (Tab. 3). The difference between arithmetic means was statistically significant ($p < .01$) also in this case. This can be explained by the fact that exercises focused on the measurement, reproduction, and differentiation of space and time (without visual control) actualize proprioceptor and tango receptor afferentation, which informs the brain about the magnitude of the angles of the joints during movement, the direction and speed of their changes, and creates the image of the linkage of the body parts. Thus, we can state that the adjusting tasks of differentiating, reproducing and measuring the spatial and temporal characteristics of motion with the eyes closed allow to improve the ability of the subject in psychomotor activity to coordinate the work of hundreds of muscles in the "body scheme" in time, as well as to repeat a variety of complex movements.

The "Accuracy of the simulation of walking at 3 meters" without visual control was also found to be significantly different before and after the supportive therapy ($p < .05$; Tab. 3). Before applying the supportive therapy, the accuracy of the simulation of the 3-meter walking test was in the order of 14.1 ± .98 cm, which went down to 10.7 ± 1.06 cm following therapy. However, it must be underlined that the relative improvement in the exercise "Accuracy of the simulation of walking at 3 meters" was worse than in the exercise at 7 meters. This difference, in our opinion, can be explained by the fact, that, when reproducing a 7-meter walk, the sensory-perceptual system of children with intellectual impairments had more time to adjust and improve their psychomotor skills than when reproducing a 3-meter walk.

We also observed that the use of a level-balanced psychomotor support in children with intellectual impairments decreased the symptoms of asynergia and dyssynergia, stereotypia and dynamic disorders and improved the plastic arbitrary movements, which became less. At the same time, it should be emphasized that the thalamus pallidum level is not adapted to the use of information concerning the environment from the visual and auditory analyzers. The supportive exercises, for which the level B was leading, improved the coordination of movements in the "body scheme", bringing the

sequence and duration of muscle tension together in time. Following the experiment, the subjects of the research considerably improved the ability to use inertial and reactive forces for solving certain psychomotor problems.

We should also add that the level of common movements and standard stamps, i.e. the level of synergies, was not stereotypical in itself and the variability of the characteristics of the exercises of free pulse gymnastics increased the ability of children with intellectual impairments to adapt their movements to the dynamic conditions of the environment.

As a consequence, the psychomotor problems concerning the coordination of movements of various parts of the body in space and time (in the body scheme) were solved on the thalamus pallidum level and the exercises chosen by us contributed to improving the management of this class of semantic tasks.

We found that the use of the supportive exercises in which the body, its parts and objects moved in accordance with the peculiarities of the surrounding space during the 16 weeks improved the coordination skills of children with intellectual impairments at the pyramidal striatal level of the spatial field. More specifically, the "Accuracy of the long jump at 75% of max" increased from 4.60 ± .30 cm to 3.11 ± .42 cm. The difference between arithmetic means was statistically significant ($p < .01$; Tab. 3). This is due to the fact that certain exercises, such as "Throwing bags to the target", "Hoop-to-the-hoop jumping", "Running bypassing the obstacles", "Two guardians" and others describe a certain "scale" of coordination of movements for which the pyramidal striatal level C is leading. Children with persistent organic impairments in cognitive activity acquired the ability to change their movements in accordance with changes in the spatial conditions of the psychomotor activity. We observed a reduction in the signs of distress, ataxia and paresis in preschoolers after 16 weeks of being exposed to the supportive exercises, showing that the spatial accuracy of "bindings" of movements to the environment was optimized.

A similar significant difference ($p < .01$) prior and following the experiment was also observed in the "Accuracy of the long jump at 50% of max". Before the experiment, this indicator was equal to 3.21 ± .27 cm, while after the supportive therapy it was equal to 2.02 ± .31 cm. The supportive exercises at the level of the spatial field contributed to the actualization of the receipt of information concerning the features of muscle work, changes in joints, balance, as well as the information from the organs of vision. On the basis of their synthesis, the subject of psychomotor activity optimized the management of complex arbitrary actions. The supportive

exercises we adopted actively involved the preserved morpho-functional formations of the central nervous system in the management of movements and, under certain conditions (requiring further neuropsychological research), contributed to the formation of new functional organs.

The supportive tasks of a spatial-target nature, addressed to the outside world, are always transposable. They are implemented on the basis of proprio-receptor, tango receptor and telereceptor afferentation. In our dataset, we observed that these exercises were characterized by considerable flexibility, i.e. a variation of kinematic and dynamic characteristics, although the spatial target remained unchanged. The supportive tasks we used helped the children with intellectual disorders to adapt to the spatial and temporal peculiarities of the subject world, bypassing the obstacles on the way to the goal.

Therefore, at the pyramidal striatal level C, psychomotor tasks, focused on the replacement of the body and objects in space, were solved and the exercises we used helped to improve the management of this class of semantic tasks.

Our results also revealed that performing our level-balanced program of psychomotor support for 16 weeks improved the coordination skills of senior preschool children with persistent organic cognitive disturbances at the sincipital premotor level of object actions or semantic chains. More specifically, the speed of the "mounting" operation before and after the experiment was 133.84 ± 5.10 s and 117.76 ± 4.81 s, respectively (mean difference: $p < .05$).

This can be explained by the fact that the supportive exercises with objects used in everyday life actualized the information both concerning the geometric features of the object and concerning its semantic purpose, promoting the development of a major coordination of the hands and fine motor skills (fast and accurate finger movements).

Finally, the speed of the "demounting" operation before and after the experiment was 81.73 ± 3.71 s and 69.55 ± 4.12 s, respectively (mean difference: $p < .05$). Managing actions for which level D was the leading one also relied on the ability to create skills based on exercises. Our observations proved that the automation of locomotor composition, sensory syntheses and central components of action greatly increased their effectiveness.

Therefore, the system of supportive exercises that we proposed at the sincipital premotor level improved the coordination skills of children in actions with objects used in everyday life and the solution of the semantic tasks of this class. At the same time, it was not only the level of the subject's

actions or semantic chains D that took part in the actions with everyday objects, but also the lower levels (as backgrounds).

3.1. Propositions

It is difficult to determine unequivocally how the growth of possibilities at the lower levels manifested itself in the results of the higher ones. We can assume that the coordination skills of the higher levels are more integral than the general psychomotor skills of the child.

Our empirical study showed that, in most of the children surveyed, the levels of movement construction on which the worst outcomes were recorded before psychomotor support therapy were delayed even after the support program. The development of psychomotor skills in actions with these levels leading was carried out more slowly. However, there were a few cases of significant progress in the coordination ability of the levels that were delayed prior to supportive care.

Therefore, using the level-balanced psychomotor support program, we created the conditions for the preschoolers with intellectual disabilities to implement their individually preserved abilities for movement management and intellectual development.

The central link in the psychomotor support of children with intellectual disabilities is the development of their ability to reorganize acquired actions and movements, the individually possible restoration of sensory disturbances, orientation and research possibilities. Thus, the conditions of intellectual development change.

4. Conclusions

1. The psychomotor support program was constructed in such a way as to include various actions with different levels of movement formation, of approximately the same volume, leading to these actions, and their implementation provided the appropriate changes in kinematic and dynamic characteristics. Its application allowed to optimize the psychomotor activity and to improve the psychomotor skills of preschool children with intellectual disabilities. These conditions lay the foundations to contribute to the implementation of the motor function of a child’s individually preserved psychophysical health.

2. Physical exercises, irrespective of their leading levels, also proved to be a kind of training for a child, in which the psychomotor qualities develop gradually, the coordination mechanisms of the psychomotor system improve and compensatory pathways are found. However, this way of psychomotor system support has shown to be less effective than the use of the level-balanced program.

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