



## **Expediency of using physical education means in the educational process of preschool-aged children with speech disorders**

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**Abstract.** Speech disorder in preschool children is among the most common nosologies. The relevance of studying the feasibility of using physical education means in work with children with speech development disorders is due to the data of scientific research, which emphasises the connection between the speech and motor skills of preschool children. The purpose of the study was to investigate the peculiarities of communication abilities and motor development of 5-6-year-old children with speech disorders and to determine, based on the analysis of scientific literature, the most appropriate means of physical education used in the work with children of this nosology. The research was conducted on the basis of preschool educational institutions No. 779 and No. 652 of combined type in Kyiv. The study involved 40 children aged 5-6 years with speech development disorders. During the ascertaining experiment, the children's communication abilities and the level of their motor development were assessed. It has been established that 50% of preschool children with speech development disorders have not undergone the operations of successive analysis and synthesis at the nonverbal level, which were assessed on the basis of the "Turtle" method. It was found that most preschoolers have not developed the nominative function of speech for communication with others – the ability to convey their thoughts through words, gestures, and signs – as evidenced by the results of the assessment of expressive and imprecatory speech. Children with speech development disorders have a delay in motor development, as evidenced by the results of motor tests. The obtained results should serve as a basis for the choice of physical education means in the educational process with preschool children with speech disorders and in the development of comprehensive programmes aimed at their correction

**Keywords:** preschoolers; general underdevelopment of speech; motor development; educational process; exercises; games

### **Introduction**

The development of the motor skills plays an important role in the formation of the child's psyche and also affects

its speech development, which is one of the most important components of the formation of a child's personality.

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Taking into account the interrelationship of children's general speech and motor skills, it is appropriate to study the peculiarities of speech and motor development in older preschool children and to analyse approaches to the use of physical education tools for the purpose of their correction and development. Statistical data on the number of children with speech disorders in preschool education institutions in Ukraine for 2018-2022 indicate that this disorder is the most common among preschoolers. According to the State Statistics Service of Ukraine, in 2018, 3,638 children with the specified nosology were recorded; in 2020, 3,328; in 2021, 3,324; and in 2022, 2,755 children (Preschool education in Ukraine, 2023).

The work of Ukrainian researchers such as O. Kozynets & L. Tsybulska (2023) is devoted to the study of the speech development of preschool children. The authors analysed modern approaches to corrective and developmental work with children with general underdevelopment of speech and also determined the most effective forms and means of the speech therapists' work, which include speech exercises and special game tasks. Researchers K.V. Eremenko & O.P. Taran (2022) developed a system for diagnosing the syllabic-rhythmic structure of speech and psychomotor skills of children with general underdevelopment of speech. The authors came to the conclusion that most preschool children with general underdevelopment of speech have an insufficiently formed syllabic-rhythmic structure of speech and psychomotor skills. It was established that the formation of skills of spatial organisation of movements and the ability to carry out spatially organised activities have a direct impact on the pronunciation of complex words, the perception of word combinations that denote objects, phenomena, signs, and the definition of accented components in a syllable series. The researchers discovered a relationship between the general underdevelopment of children's speech and the formation of their motor skills, which became the basis for the development of a diagnostic system that includes two aspects: psychomotor and the syllable-rhythmic structure of speech.

A. Tinazova (2022) emphasises the need to develop spatial concepts in children with a general underdevelopment of speech. The researchers presented an algorithm of actions for the correction of features of spatial functions in older preschoolers with general underdevelopment of language, which includes planning the directions of corrective work with children in accordance with innovative forms of work during corrective and developmental classes, in particular in the form of games. Carried out by B. Bukhovets *et al.* (2021), analysis shows the absence of modern developed programmes for the organisation of the process of physical education of older preschool children with impaired speech development, the prerequisite for the development of which should be the study of the motor development of the specified contingent. The authors share the opinion of I. Omelianenko (2018) that the implementation of an effective corrective and health-improving effect on the body of children with speech disorders by means of physical education should be based on the study of their motor function. As the author notes, the study of the peculiarities of the psychophysical development of children and the assessment of their cognitive and motor capabilities and abilities should be the basis for

the meaningful filling of classes, the formation of methods, the choice of forms of organisation of classes, and the conditions of their conduct. Despite the interest of scientists in the study of issues related to the correction of speech disorders in older preschool children, the study of their motor development, communicative abilities, and approaches to the use of physical education tools in the educational process of special education needs further study. The purpose was to investigate the peculiarities of communicative abilities and motor development in 5-6-year-old children with speech disorders and to determine the means of physical education for working with such children.

## Materials and Methods

In order to study the relevance of the researched problem and determine the purpose of the research, the method of analysis and generalisation of scientific literature data was used. In order to comprehensively analyse the data of the scientific literature, a systematic information search was carried out with the help of Ukrainian and international resources. The research was conducted during September-October 2023 on the basis of preschool education institutions No. 779 and No. 652 of the combined type in Kyiv, Ukraine. Forty children ( $N = 40$ ) aged 5-6 with delayed speech development took part in the study. The specified contingent of participants was involved in the study voluntarily. The participation of children in all stages of the pedagogical experiment, the analysis of the data obtained in the process of the research, and the publication of the research results were carried out based on the written consent of the parents. Parents were warned about the anonymity of their children's participation in the study. The study was conducted in compliance with the ethical principles for medical research involving human subjects (Declaration of Helsinki, 2013). The data obtained in the research process was processed by the method of determining the relative share indicators using Microsoft Excel 2010 spreadsheets.

In the course of the ascertaining pedagogical experiment, an assessment of the communicative and motor development of children aged 5-6 years was carried out. In order to evaluate the motor skills of children 5-6 years old, the following tests were used: standing on tiptoes with open eyes for 10 s; jumping with open eyes alternately on the right and left leg for 5 m; throwing a ball at a target at a distance of 1.5 m; jumping over a rope stretched 20 cm from the floor; walking 2 m along the rope, putting the toe of one foot to the heel of the other. The result was considered positive if the exercise was performed from start to finish. In order to study the formation of operations of successive (sequential, by parts) analysis and synthesis at the non-verbal level, the "Turtle" method was used, which involved the reproduction of a digital series using visual material. The child was offered a card with the image of a turtle, on the shell of which the numbers from 1 to 9 are randomly placed, which must be shown and named in order, that is, independently reproduce a linear series (Andrusyshyna, 2012).

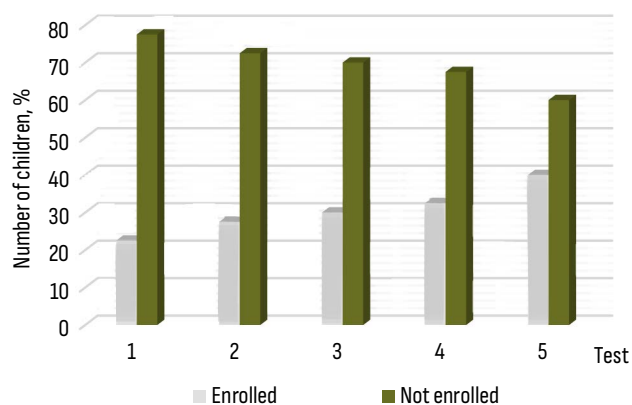
The study of expressive speech included an assessment of the nominative function, which reflects the child's ability to express thoughts and exchange information. The

assessment of the nominative function of speech was carried out on the basis of tasks related to the child's naming of objects (in one word) by pictures. The assessment of the performance of the task was carried out on a 5-point scale: 5 – exact name; 4 – search for the correct name; 3 – incorrect grammatical form of the word; 2 – distortion of the sound-syllabic structure of the word; 1 – distant verbal change. The study of impressive speech included an assessment of understanding of the names of objects distant in sound and meaning, understanding of words close in sound, and understanding of names of actions distant in meaning and sound, which allowed the children to assess their understanding of the speech addressed to them. The result was evaluated on a 5-point scale: 5 – correct execution; 4 – 2-3 mistakes; 3 – questioning; 2 – changing the order of words; 1 – skipping or changing words.

### Results and Discussion

The results of the evaluation of expressive speech – the ability to convey one's thoughts and feelings using words, gestures, signs, and symbols – indicate that 37.5% ( $n = 15$ ) of children have a distant verbal change; 15% ( $n = 6$ ) distort the sound-syllable structure of the word; 25% ( $n = 10$ ) of preschoolers build the grammatical form of the word incorrectly; 20% ( $n = 8$ ) search for and find the correct name; and only 2.5% ( $n = 1$ ) could not complete the task. This indicates that the majority of preschoolers do not have a nominative speech function for communicating with others. The results obtained during the evaluation of expressive speech, that is, the understanding of information presented in different ways, for example, sounds and words, movements and gestures, signs and symbols, indicate that 45% of children ( $n = 18$ ) changed the order of words in a sentence; 30% ( $n = 12$ ) of older preschoolers skipped or changed words; and 25% ( $n = 10$ ) questioned, which indicates a lack of understanding of the task. It is worth noting that among the children who were involved in the study, there were none who were able to complete the task with minor errors (2-3) or to complete it correctly.

The results of the study of the state of formation of operations of successive analysis and synthesis at the non-verbal level indicate that 50% ( $n = 20$ ) of preschoolers have transfer difficulties: the child cannot reproduce a number series or distorts its linear structure (rearranges and/or omits numbers); 27.5% ( $n = 11$ ) of children, together with an adult, determine the linear principle of relations between elements and later independently reproduce them in the process of forming a numerical series; 12.5% ( $n = 5$ ) of children, based on the fragment of a linear construction demonstrated by the teacher, independently determine and reproduce the given type of relationship between the elements of the numerical series; and only 10% ( $n = 4$ ) correctly and independently perform the task after providing stimulating or organising assistance. Among the children who participated in the study, no one was found who could independently reproduce the linear relationships between the elements of the numerical series, abstracting from the visually dominant secondary features. After receiving the results of the speech evaluation, the motor skills of preschoolers were evaluated based on a number of tests. Their results are presented in Figure 1.



**Figure 1.** The results of motor tests performed by preschoolers aged 5-6 years

**Note:** 1 – standing on tiptoes with open eyes for 10 s; 2 – jumping with open eyes alternately on the right and left leg for 5 m; 3 – throwing a ball at a target at a distance of 1.5 m; 4 – jumping over a rope stretched 20 cm from the floor; 5 – walking 2 m along the rope, putting the toe of one foot to the heel of the other

**Source:** created by the authors

During the research, it was established that only 22.5% ( $n = 9$ ) of preschoolers are able to perform a stand on their toes with their eyes open for 10 s without errors, and the majority, 77.5% ( $n = 31$ ) could not cope with the task. When performing jumps over a rope stretched at a height of 20 cm, the main task was to perform a jump with two legs. 32.5% ( $n = 13$ ) of children coped with the task. 67.5% ( $n = 27$ ) of preschoolers failed the test. It should be noted that most children performed jumps alternately with the right and left leg; that is, they could not reproduce the movements that the instructor demonstrated before the task. Despite the fact that children made minor mistakes when throwing the ball at a target at a distance of 1.5 m, the result was considered positive when hitting the target. At the same time, only 30% ( $n = 12$ ) of older preschoolers completed the specified exercise. Among the children who took part in the study, the largest number, namely 40% ( $n = 16$ ), coped with the task of walking 2 m along the rope, putting the toe of one foot to the heel of the other. Only 27.5% ( $n = 11$ ) showed a positive result in the test: jumping with open eyes alternately on the right and left leg at a distance of 5 m. The obtained results indicate the inability of a significant number of 5-6-year-old children with impaired speech development to perform motor tests, which indicates the need to find means that would allow for a purposeful influence on the speech and motor skills of older preschool children.

The analysis of the scientific literature shows the significant interest of scientists in studying issues related to the correction of the speech development of children of older preschool age. According to researcher K. Alimova (2022), speech therapy work should be carried out through a system of games and exercises. The gradual assimilation of new knowledge and the development of hand movements together with fine motor skills can influence the formation of mental abilities, cognitive activity, and visual-motor coordination. G. Ibatova *et al.* (2021) and L. Stakhova & A. Loza (2022) suggest using mobile games

in the corrective process to overcome children's speech disorders. According to scientists, mobile games, which include the performance of certain motor actions, contribute to the simultaneous satisfaction of children's needs in motor activity and allow them to solve educational tasks, help reduce tension, increase work efficiency, and improve the quality of knowledge acquisition.

Researcher A. Hrydasova (2022) conducted a theoretical analysis of the expediency of using logopaedic rhythms in early childhood education for the purpose of preventing speech disorders, considered the possibility of using the author's method of logopaedic rhythms during music classes with preschoolers, and also gave examples of speech therapy rhythm exercises that can be used in music classes. Features of the use of speech therapy rhythm exercises in classes with children with underdeveloped speech are considered in the work of I. Samoilova & O. Kolomyichuk (2022). Scientists note that speech therapy rhythm classes contribute to the correction of small and general movements, the development of "speech-movement" coordination, the increase of children's vocabulary, the improvement of psychophysical functions, and the development of emotionality and communication skills. Logarithmic classes are based on the close relationship "word – movement – music" and include exercises for the development of fine motor skills, finger, language, music-movement, and communicative games; dance exercises for rhythm declamation or singing; rhythm games using musical instruments; and reading poems in combination with movements.

M.Ye. Takhirova (2022) notes that classes in speech therapy rhythms contribute to the strengthening of the locomotor apparatus, the development of breathing and motility, the formation of correct posture, motor skills and abilities, and the development of physical qualities. According to the researcher, speech therapy classes should be divided into two groups: the first is aimed at the development of coordination, orientation in space, muscle strengthening, as well as the development of cognitive processes such as memory, thinking, attention, and imagination; the second is speech exercises that form correct

breathing, the ability to control the voice, the perception of speech and other sounds by ear, the formation of pronunciation, intonation, etc. Authors Y. Akamoglu *et al.* (2019) emphasise the need to create an environment in which speech-impaired children can improve their communication skills while performing motor tasks.

In the scientific literature, the data on the use of physical education tools for the comprehensive (speech and movement) development of older preschool children are presented rather fragmentarily. In particular, the work of N. Petrenko (2018) presents the author's programme of dance-corrective orientation for children with speech disorders, which involved the inclusion of sports dance exercises, exercise ball gymnastics, dance gymnastics, fairy-tale therapy, speech therapy rhythm exercises, as well as breathing exercises. The programme included 4 stages (adaptive-organisational, corrective-complicating, corrective-stabilising, and final-summary), each of which involved the use of dance exercises and games aimed at correcting speech, forming accuracy and speed of reaction to sound and verbal signals, improving qualities of attention and memory, verbal regulation of actions by matching words and movements, as well as the formation of skills to perform motor actions according to a conditional signal.

Scientists N. Panhelova & T. Krutsevych (2019) substantiated and determined the effectiveness of the influence of motor activity on the speech development of older preschool children. During the research, the authors monitored the level of speech development of preschool children and implemented technologies aimed at integrating their speech and physical development. The scientists came to the conclusion that the implementation of an integrated approach based on the use of finger, articulation, breathing, rhythmic gymnastics, fitness technologies, and story-role speech therapy rhythm exercises effectively affects the speech and motor development of children. Therefore, the most effective and appropriate means of working with children with speech disorders have been identified by scientists as logopaedic rhythms, exercise ball gymnastics, rhythmic gymnastics, breathing exercises, and mobile games (Table 1).

**Table 1.** Tools used in working with children with speech disorders

Means	Content and orientation
Logopaedic rhythms	Musical-movement, music-speech tasks and exercises, and movement games that combine the performance of movements with musical accompaniment are aimed at correcting the child's speech development.
Exercise ball gymnastics	A system of physical exercises on exercise balls, which are performed from different starting positions (sitting on the ball, lying on the back or on the stomach; standing, holding the ball in the hands), contribute to the development of coordination in children's movements, allow you to create a positive emotional atmosphere, and increase children's interest in physical exercises.
Callisthenics	Exercises aimed at the development of physical qualities (strength, speed, endurance, flexibility, coordination), the formation of tempo, and the development of metro-rhythmic sense.
Breathing exercises	A system of breathing exercises aimed at forming the ability to control breathing. In the process of using breathing exercises, respiratory muscles are trained, proper rhythmic breathing is formed, the child is freed from respiratory and speech spasms, cerebral blood circulation improves, sleep quality is reduced, and anxiety is reduced.
Moving games	Contribute to the normalisation of motor function, the development of hand movements in combination with fine motor skills, influence the formation of mental abilities, cognitive activity, visual-motor coordination, form game skills, and encourage the creativity of children.

Source: created by the authors

The obtained data on the assessment of expressive and impressive speech in preschool children correlates with the results of the study by T. Ovsienko (2021). The author notes that preschool children with motor alalia are characterised by medium and low levels of expressive speech and the development of auditory perception and understanding of speech. Scientific research data by O. Bielova (2023) indicate that the average level of impressive speech is characteristic of 29.4% of older preschool children with speech disorders, and 7.8% of children experience difficulties when performing tasks. In the process of evaluating expressive speech, the researcher found 45.9% of children who need help while performing tasks and 13.2% of children with speech pathology are not able to analyse pictures with objects. The results of scientific investigations by L. Rodgers *et al.* (2023) indicate that 36% of 4-year-old children have expressive speech characteristics, and most of them experience difficulties in understanding spoken language. Signs of a phonological speech disorder are a change in the order of words in a sentence, verbal substitutions, and questioning, which are the consequences of a limited vocabulary, which is consistent with the results of the evaluation of children's impressive speech. Research results by H. Motychka & K. Barna (2019) and C. Varuzza *et al.* (2022) testify that children with general underdevelopment of speech have a lag in the development of physical qualities, difficulties in the correctness and accuracy of performing motor tasks, memorising the sequence of movements, performing exercises according to verbal instructions, reproducing the given pace and rhythm of movements, and underdevelopment of fine motor skills. Such conclusions are consistent with the results obtained in this study, in particular, when children with speech disorders perform motor tests.

The obtained data are consistent with the results of research by foreign scientists C. Varuzza *et al.* (2022), who testify that 4-7-year-old children with speech disorders have difficulties performing tasks related to the manifestation of coordination abilities, in particular, in performing balance exercises. Scientists have determined general, small, and visual-motor skills in children aged 4-7 years with speech disorders, which are divided into three subgroups: speech disorder, sound-pronunciation disorder, and combined. During the research, it was confirmed that children who were included in the combined subgroup (speech and sound-pronunciation disorders) have disorders of coordination, fine motor skills, and visual perception. E. Smolak *et al.* (2020) assessed and compared the attention of children with speech disorders and children with typical speech development and determined the relationship between visual-spatial attention, visual-spatial memory, and speech abilities. The authors came to the conclusion that children with impaired speech development have a deficit of visual-spatial attention and its stability. Based on the analysis of scientific literature, it was established above in the article that the use of games and exercises can positively influence the development of a child's speech, improving his visual-spatial attention.

The results of research by Z. Mukhtoralievna & B. Odilovna (2023) testify to the need in the process of the child's speech development to form cause-and-effect relationships in various life situations, in particular, in the

process of performing motor tasks. This will allow the child to independently determine the ways to achieve the goal and to choose means of activity, for example, games, to form independence. In the research based on the experiment, it was proven that children with speech disorders have difficulties performing both motor and other tasks, which is shown by the results of the assessment of successive, expressive, and impressive speech. The use of game-based means of physical education, in particular those summarised in Table 1, can help the child gain more independence. The work of L. Anoško (2019) presents the results of the assessment of the motor abilities of preschool children with speech disorders. The author established that children with speech disorders have an insufficient level of development of strength and speed-strength abilities, endurance, and coordination abilities. In this study, on the basis of a motor test, it was also established that most preschool children with language disorders have difficulties performing exercises. L. Anoško (2019) found a direct relationship between the speech disorders of preschoolers and their physical development, in particular their fine motor skills. Thanks to the application of a set of exercises that included both speech therapy and physical classes, the children's fine motor skills significantly increased, and with it, the overall development of communication skills improved.

Among the various types of psychophysical disorders of the development of preschool children, a significant number of disorders of speech development are recorded. In the studies of a number of scientists, the relationship between children's general and speech motor skills has been studied and confirmed. The formation of motor skills is an important factor in the activation of speech and the elimination of speech disorders in children of older preschool age. However, the attempts of scientists to solve these problems are characterised by a fragmented approach; there are practically no scientific developments aimed at comprehensively solving issues related to improving the communicative and motor development of children with speech disorders. Despite the data available in the scientific literature, which testify to the effectiveness of the use of physical education tools in the process of working with children of older preschool age with impaired speech development, the solution to the outlined problem requires the search and development of modern, complex approaches that will allow the correction of speech and motor development in aged children 5-6 in the educational process of preschool education institutions.

## Conclusions

In the process of assessing the communicative abilities of 5-6-year-old children with speech disorders, it was established that the operations of successive analysis and synthesis at the non-verbal level are not formed. 10% of children are able to independently complete tasks aimed at reproducing the number series. The results of the evaluation of expressive speech indicate that children with speech disorders are characterised by a long verbal change, distortion of the sound-syllabic structure of the word, and incorrect construction of the grammatical form of the word, which indicates that the nominative function of speech is not formed. The results of the assessment of impressive speech proved that children aged 5-6 years with impaired speech

development experience difficulties in understanding the speech addressed to them and, as a result, make mistakes when performing the assigned tasks.

It has been established that a feature of children with impaired speech development is a lag in the development of the motor skills, which is confirmed by the results of conducted studies, which indicate the inability of most children (up to 77.5%) to perform motor tests, in particular standing on toes with eyes open, jumping with open eyes alternately on the right and left leg, throwing a ball at a target at a distance, jumping over a rope stretched at a height, and walking on the rope by putting the toe of one foot to the heel of the other. In the process of physical education for older preschool children with speech disorders, it

is advisable to alternately use a system of mobile games and exercises, speech therapy rhythms, dance exercises, and exercise ball gymnastics, finger, articulation, breathing, and rhythmic gymnastics during the day. Prospects for further research are in the diagnosis of the motor and communicative skills of children aged 5-6 years with impaired speech development as a key prerequisite for the development of a complex corrective programme of classes.

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## Conflict of Interest

None.

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## Доцільність застосування засобів фізичного виховання в освітньому процесі з дітьми дошкільного віку з порушеннями мовлення

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**Анотація.** Порушення мовлення дітей дошкільного віку є лідером серед найбільш поширених нозологій. Актуальність вивчення доцільності застосування засобів фізичного виховання у роботі з дітьми з порушеннями мовленнєвого розвитку зумовлена даними наукових досліджень, у яких наголошується на взаємозв'язку між мовленнєвою та руховою сферами дітей дошкільного віку. Мета дослідження полягала у вивченні особливостей комунікативних здібностей та рухового розвитку дітей 5-6 років із порушеннями мовлення та визначенні на основі аналізу наукової літератури найбільш доцільних засобів фізичного виховання, які використовуються у роботі з дітьми зазначеної нозології. Дослідження проводились на базі закладів дошкільної освіти № 779 та № 652 комбінованого типу м. Київ. У дослідженні взяли участь 40 дітей 5-6 року життя з порушенням мовленнєвого розвитку. У процесі констатувального експерименту здійснено оцінку комунікативних здібностей дітей та рівня їхнього рухового розвитку. Встановлено, що в 50 % дошкільнят із порушеннями мовленнєвого розвитку не сформовано операції суцесивного аналізу й синтезу на невербальному рівні, оцінка яких здійснювалася на основі методики «Черепашка». Виявлено, що в більшості дошкільнят не сформована номінативна функція мовлення для спілкування з оточуючими – здатність передавати свої думки за допомогою слів, жестів, знаків, про що свідчать результати оцінки експресивного та імпресивного мовлення. У дітей із порушеннями мовленнєвого розвитку виявлено відставання в розвитку рухової сфери, про що свідчать результати рухових тестів. Отримані результати повинні слугувати підґрунтям у виборі засобів фізичного виховання в освітньому процесі з дітьми дошкільного віку з порушеннями мовлення та під час розробки комплексних програм, спрямованих на їх корекцію

**Ключові слова:** дошкільнята; загальний недорозвиток мовлення; руховий розвиток; освітній процес; вправи; ігри