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The impact of Playdough games on the development of oral motor skills in preschool children with childhood apraxia of speech

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Abstract. The relevant challenges are the use of innovative approaches that conserve both the speech therapist's and the child's resources while addressing multiple goals in speech therapy. The authors of this article have adopted such an approach to develop oral motor skills, which are crucial for speech development in preschoolers, particularly those with childhood apraxia of speech. This study aimed to evaluate the effectiveness of an author-developed therapy using Playdough games for preschool children with childhood apraxia of speech. A controlled design with repeated measures was employed. The primary diagnosis of CAS was established based on clinical assessment. A comparative evaluation of two groups (control and experimental) was conducted using a developed methodology for assessing the level of manual and oral motor skills in preschool children before and after the author-developed therapy using Playdough games. Researchers discovered that the systematic use of their author-developed Playdough games positively impacted the motor skills of children with CAS. Children in the experimental group, who participated in Playdough therapy, demonstrated significant improvements in both manual and oral motor skills, increased precision and focus in movement execution, and enhanced accuracy and speed of articulatory movements. There was a reduction in delays and incorrect movement sequences during finger movement tasks. Children required less additional time and significantly less assistance from the speech therapist, indicating a positive impact of using Playdough in therapy. The following skills improved: transitions between articulatory

positions, which helped children avoid coarticulation difficulties; planning of movement sequences; and smooth transitions between sounds and syllables. The practical significance of this study lies in the effectiveness of using Playdough games for significantly improving oral motor skills, movement precision, and concentration in children with childhood apraxia of speech, thereby reducing the need for additional speech therapy support

Keywords: games with plasticine; speech disorders; motor functions; effectiveness; formative approach

INTRODUCTION

The relevance of this research is driven by the need for innovative and effective approaches to therapy for children with childhood apraxia of speech (CAS) who experience difficulties with oral motor skills. The use of Playdough as a multi-functional tool in speech therapy shows promise for the comprehensive development of these skills in this specific group of children. Moreover, the integration of creative and interactive methods into therapy can make sessions more engaging and motivating for children, increasing their participation in the learning process. Given the positive results obtained in the experiment, this research can contribute to expanding the range of effective techniques for speech therapy with children who have CAS and improving the quality of care provided to this patient group.

Oral-motor skills encompass the movements of the muscles of the mouth, lower jaw, tongue, lips, and cheeks. The strength, coordination, and control of these movements are essential for feeding (sucking, chewing, biting) and are crucial for speech articulation and facial expressions. Children with childhood apraxia of speech (CAS) often have impairments in these skills, which can negatively impact their ability to speak clearly and understandably. Research by A.M. Chilosi *et al.* (2022) and J. Iuzzini-Seigel *et al.* (2022) demonstrates that these children frequently exhibit impairments not only in the oral motor but also in manual motor skills. The close relationship between manual and oral motor skills in children is highlighted in studies by H.B. Caldwell (2022) and R. Onesimo *et al.* (2023). Impairments in these skills in children with CAS can negatively affect their speech development for several reasons:

1) Difficulties in motor planning and programming, specifically, children with CAS may find it challenging to plan the sequence of manual movements required to complete a motor task (Bombonato *et al.*, 2022), such as assembling a puzzle or building with blocks. In the speech, difficulties with planning and programming oral movements manifest in challenges with coarticulatory transitions, which occur when the articulation of different speech segments overlaps, causing the articulatory configurations of different sounds to interfere with each other. Anticipatory coarticulation (where planning the articulation of the next sound influences the previous one) and perseverative coarticulation (where the articulatory configuration of one sound influences the articulatory configuration of the next) are normal processes, but problems with motor planning and programming often lead to impairments in this function.

2) Slow and inept coordination of movements: children with CAS may find it difficult to perform tasks that require precise hand coordination, such as catching a ball or drawing (Grigos *et al.*, 2024). Similarly, difficulties in coordinating the movements of the articulators will lead to speech errors (Iuzzini-Seigel *et al.*, 2022; Onesimo *et al.*, 2023).

3) Impaired rhythmic skills (arrhythmia, lack of fluidity): children with CAS may find it difficult to reproduce rhythmic sequences, both with their hands and their articulators (Mohamadi, 2020; Miller & Guenther, 2021; Vuolo & Wisler, 2022).

Early diagnosis and intervention can help children with CAS develop the necessary skills for clear and understandable speech (Grigos *et al.*, 2024). One such tool is the use of Playdough games. Playdough is a soft, colourful dough for children's play, made from flour, salt, water, and food colourings. It is available in a variety of colours, textures, and forms, and is both simple and safe to use. Playdough is affordable and does not require significant financial or time investments, while also allowing educators to choose different colours and scents for the material. Playdough is an effective tool for developing children's manual skills (Suryameng, 2016; Shire *et al.*, 2021), that is, the skills of the hand and finger muscles. By playing with Playdough, children squeeze, squish, and throw it, strengthening their muscles, improving coordination (particularly visual-motor coordination), and developing tactile and proprioceptive sensitivity. Playdough also helps to develop bilateral hand coordination.

The motor and premotor brain structures that control actions, motor activity, coordination, speech mobility, and articulation interact with structures responsible for gross and fine motor skills. Therefore, the simultaneous activity of hand movements and articulators during Playdough modelling contributes to strengthening the muscles of the fingers and articulators; determining the position of the articulators through the development of proprioceptive sensitivity; coordinating and planning the movements of the fingers and articulators when reproducing rhythmic sequences; and facilitating coarticulatory transitions between articulatory positions. The study aimed to investigate the impact of Playdough games on the development of oral

motor skills in preschool children with CAS. The novelty of the research lies in its interdisciplinary approach to studying the problem, systematising theoretical material on the features of the formation of manual and oral motor skills in preschool children with CAS, and developing an author's therapy using Playdough games.

MATERIALS AND METHODS

This study employed a controlled repeated-measures design. Participants received therapy involving Playdough games for 14 weeks between September and December 2022. Both manual and oral motor skills were assessed before and after the therapy. The study included 20 children aged 4-6 years with CAS, normal intelligence, and no co-occurring disorders. The diagnosis of CAS was established based on a clinical assessment that included: a neurologist's report, speech development history, a report from the (IRC), an articulation assessment, an assessment of phonological skills, and a language assessment. Before the study, parents were informed and provided consent. The study was organised based on cooperation agreements between Borys Grinchenko Kyiv Metropolitan University and the preschool educational institution. Permission to conduct the study was granted by the administrations of Preschool educational institution No. 485 and Borys Grinchenko Kyiv Metropolitan University.

Ten children (experimental group) participated in a 14-week program at a preschool, receiving additional therapy that included author-developed Playdough games focused on developing manual and oral motor skills. Meanwhile, another ten children (the control group) did not receive any additional therapy involving Playdough games and continued solely with the correctional programme provided by the institution. Therapy sessions were conducted by experienced speech-language therapists specialising in CAS, along with students of the second (master's) level students from Borys Grinchenko Kyiv Metropolitan University studying Speech Therapy. These 30-minute sessions, both individual and group, were held twice a week, totalling 20 individual and 8 group sessions per child. The therapy included the following components:

- development of manual skills;
- development of oral motor skills.

Before and after therapy, the development of manual and oral motor skills in both the experimental and control groups was assessed. A diagnostic tool was developed specifically to evaluate these skills in preschool children. The tasks designed for assessing manual skills were based on diagnostic methods from C. Amiel-Tison & J. Gosselin (2001); S.E. Henderson *et al.* (2007); Y.V. Ribtsun (2023). The diagnostic tasks for the assessment of oral motor skills were based on the developments of A.V. Korol (2017); N. Babych & K. Tychyna (2021a); Y.V. Ribtsun (2021). The assessment method consisted of two blocks. *Block I* focused on assessing manual skills, using tasks that required reproducing a series of finger positions with the dominant and non-dominant hands, based on visual or kinesthetic cues. These tasks were divided into two series: the first series focused on reproducing static and dynamic finger positions using visual cues with both dominant and non-dominant hand, and the second series involved reproducing the same tasks with the dominant and non-dominant hand based on kinesthetic sensations (with eyes closed). Block II focused on assessing oral motor skills and also included two series of tasks. The first series assessed the ability to reproduce static and dynamic articulatory exercises in front of a mirror or without a mirror, following verbal instructions. The second series aimed to determine the level of oral motor skill development, specifically the ability to perceive the positions of the lips, tongue, lower jaw, and cheeks while articulating sounds, using visual cues or prompt cards.

The research was conducted with consideration for the age-specific and psychological characteristics of preschool children with CAS. All ethical principles were adhered to, and the rights of each research participant were not violated. The honour and dignity of participants were not undermined, discrimination was not tolerated, and no harm was caused to the participants' health. During the testing, recommendations regarding the ethical aspects of conducting educational research developed by authoritative organisations such as the American Educational Research Association (2011) and the British Educational Research Association (2018) were followed. Results were published anonymously.

The theoretical and methodological foundation for studying the impact of Playdough games on the development of manual and oral motor skills in preschool children with childhood apraxia of speech (CAS) was established through numerous research studies. These include investigations into the development of oral-motor skills and speech (Alcock, 2006; Gernsbacher *et al.*, 2008). Additionally, research on childhood apraxia of speech and related neurological and behavioural aspects has been considered (American Speech-Language-Hearing Association, 2007; Iuzzini-Seigel *et al.*, 2022; Grigos *et al.*, 2024). In the context of using Playdough games to develop children's manual skills, the studies of S. Suryameng (2016) and K.A. Shire *et al.* (2021) are noteworthy, highlighting therapeutic approaches based on dynamic and tactile cues used with young children. A crucial aspect of this research involved the diagnosis and assessment of manual and oral motor skills (Henderson *et al.*, 2007; Babych & Tychyna, 2021b; Ribtsun, 2023), allowing for a comprehensive evaluation of the development of these skills. Furthermore, empirical studies and models explaining speech and motor impairments in children with CAS were considered (Malmenholt *et al.*, 2017; Miller & Guenther, 2021).

Methods of analysis and synthesis were employed to examine key aspects of manual and oral motor skills, patterns of their development in children, and their levels of development in preschool children with typical development and CAS. Additionally, research on Playdough games and their impact on the development of manual and oral motor skills in preschool children was explored.

Experimental and testing methods were used to investigate the status and level of development of manual and oral motor skills in children before and after the experimental intervention (therapy) in both the experimental and control groups. Assessments were conducted individually with each child. The pedagogical experiment method was directly applied during therapy sessions involving Playdough games with children in the experimental group only. The Playdough therapy consisted of three stages, as presented in Table 1.

Table 1. Stages of therapy using Playdough games for the development of manual and oral motor skills in preschool children with CAS

Stage	Goal	Frequency	Type of session
Preparatory stage	Familiarisation and study of 2 sets of exercises for developing manual (24 exercises = 12 static + 12 dynamic) and oral motor skills (24 exercises = 12 static + 12 dynamic)	Within 8 sessions; 1 session = 3 exercises for developing manual skills + 3 exercises for developing oral motor skills	Individual therapy
Main stage	Combining the exercise sets learned in the preparatory stage to develop manual and oral motor skills simultaneously; consolidating simultaneous performance in the game "Find a Pair"	Within 12 sessions	Individual therapy
Final stage	Independent practice of consolidated skills in a board game	Within 8 sessions	Group therapy

Source: developed by the authors

A comparative method was employed to analyse the level of development of manual and oral motor skills before and after therapy in both the experimental and control groups. Quantitative and qualitative analysis methods were applied to interpret the results and examine the impact of Playdough games on the development of manual and oral motor skills in preschool children with CAS. A data summarisation method was used to formulate conclusions. The study had a relatively small sample size and did not include a comparison group with other types of therapy.

RESULTS AND DISCUSSION

Diagnosis using the author's methodology enabled an empirical evaluation of the development of manual and oral motor skills before and after therapy using Playdough games and determined their level of development in children with CAS. The summarised results of the assessment for Block I, which focused on the development of manual skills in children with CAS before and after therapy (the formative experiment) in the experimental group, are presented in the diagram (Fig. 1).

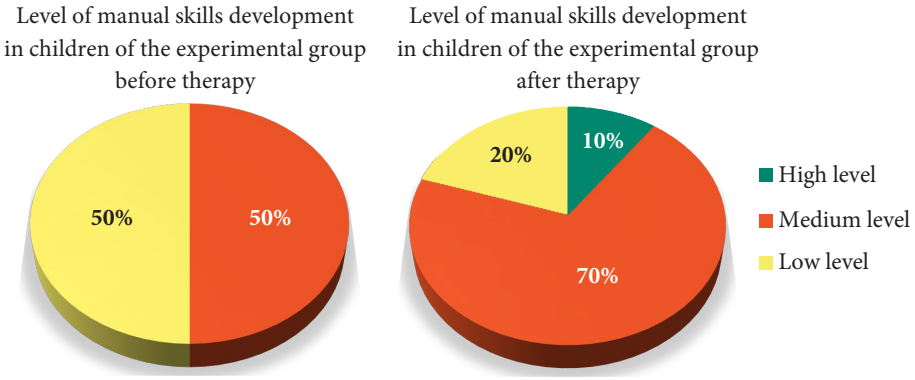

Figure 1. Level of manual skills development in preschool children with CAS (experimental group) before and after therapy

Source: developed by the authors

The results presented in the diagram (Fig. 1) indicate an increase in the level of development of manual skills in the experimental group of children. Specifically, there was an increase in the proportions of both high and medium levels of manual skills development, while the proportion of children at the low level decreased accordingly. Qualitative analysis of the results revealed the following changes: the children became more focused and concentrated during the tasks; the quality and accuracy of their movements improved when completing the diagnostic tasks based on

kinesthetic examples. Notably, difficulties that manifested as trembling and slow, hesitant movements decreased. There was an increased percentage of accurately executed positions involving the flexion and extension of individual fingers. When repeating finger positions in a specific rhythm, the children found it easier to maintain the designated rhythm and transition smoothly from one movement to another. This is evidenced by a reduction in the occurrence of unnaturally interrupted and uncontrolled movements that had previously complicated the execution of rhythmic tasks before therapy. The number of delays and incorrect movement sequences during the execution of finger movement tasks decreased. While performing diagnostic tasks, the children required less additional time and significantly less frequently sought help from the speech therapist to execute movements correctly. There was a notable improvement in finger dexterity and differentiation during the tasks, indicating a positive impact of the use of playdough in the therapy. The quality of performance on diagnostic tasks such as "Pointing Gesture", "Pincer Grip", "Bunch" and others significantly improved. In terms of the indicators for the control group, no significant changes in the development of manual skills occurred during the formative phase alongside the experimental group (Fig. 2).

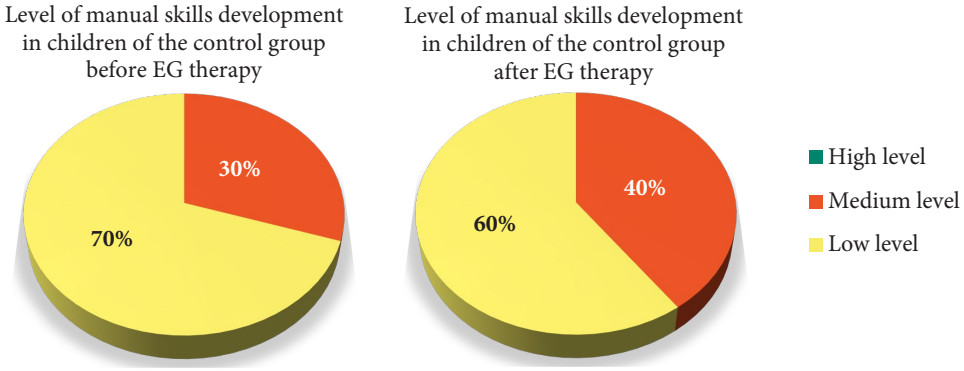

Figure 2. The level of manual skills development in preschool children with CAS (control group) before and after the therapy of the experimental group (EG)
Source: developed by the authors

It was observed that there was a slight increase in the proportion of children demonstrating a medium level of manual skill development, and correspondingly, a decrease in those at a low level. However, the high level remained unattainable for these children. It can be hypothesised that these results are linked to insufficient targeted intervention aimed at developing manual skills in this particular group of children and that they may require additional exercises not only in speech therapy sessions but also in physical education classes. This is because speech therapists in preschool institutions may not be able to address all aspects of manual skill development, as it falls outside their primary scope of practice. The results of the diagnostic assessment of oral motor skills in the experimental group before and after therapy are presented in the diagram (Fig. 3).

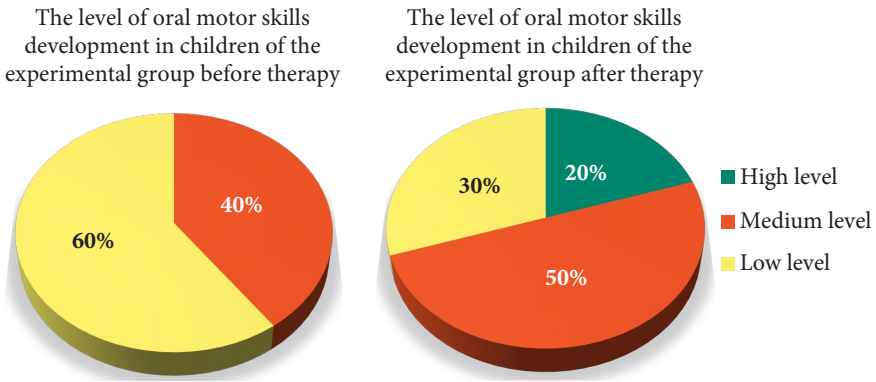

Figure 3. Level of oral motor skills development in preschool children with CAS (experimental group) before and after therapy
Source: developed by the authors

As a result of the formative phase of the study, there was an increase in the level of development of oral motor skills in the experimental group of children. The indicators for both the high and average levels significantly improved,

leading to a corresponding decrease in the low level of oral motor skills. The qualitative indicators of these changes included an increase in the accuracy of completing the proposed tasks, as well as enhanced speed and fluidity of articulation movements and improved coordination and intentionality of actions. Through systematic therapy, the children learned to transition smoothly from one articulatory position to another, which helped them avoid difficulties with coarticulatory transitions, resulting in clearer and more comprehensible pronunciation of sounds. The children became better at planning the sequence of movements necessary for the correct formation of sounds. They demonstrated improved control over the rhythm and pace of speech, which enhanced the fluidity of transitions between sounds and syllables. With the enhancement of articulation skills, the time taken to find the appropriate articulatory position decreased, and the level of attention concentration during exercises increased. The quality of performance in diagnostic tasks such as "Hill", "Straw", "Smile", and "Vowel Pronunciation" (in Ukrainian) significantly improved. In contrast, the results of the repeated assessment of oral motor skills in the control group did not reveal any significant changes (Fig. 4).

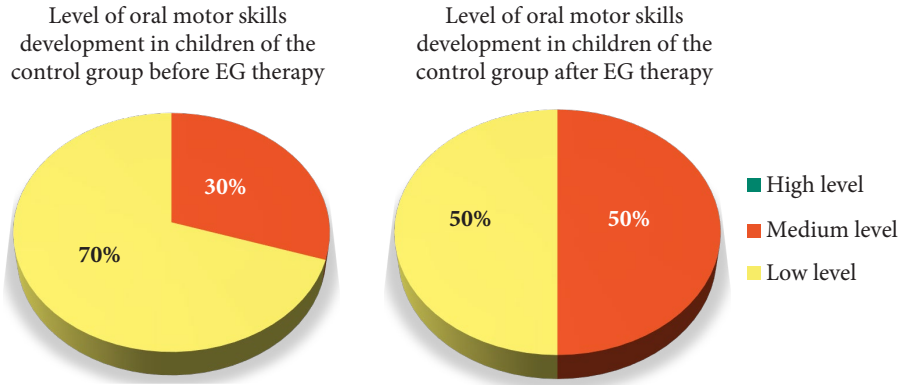

Figure 4. The level of oral motor skills development in preschool children with CAS (control group) before and after the therapy of the experimental group (EG)
Source: developed by the authors

There was a slight increase in the proportion of children demonstrating a medium level of oral motor skill development. Children showed improved performance on tests assessing oral motor skills, with a reduced need for time to find the correct position and more precise movements. This could be attributed to the fact that while these children received services according to the preschool's schedule, they did not receive therapy involving Playdough games. While progress was made, the rate of skill development was significantly slower compared to the experimental group, indicating that the control group was unable to acquire oral motor skills at the same pace within the same timeframe.

The research findings demonstrate that the proposed therapy using Playdough games has a positive impact on the development of both manual and oral motor skills in preschool children with CAS. Qualitative changes indicate a strengthening of the muscles in the fingers and articulatory organs (lower jaw, lips, and tongue); development of the ability to perceive the position of fingers and articulatory organs through proprioceptive sensitivity; improved quality and precision in targeted activities; enhanced coordination between fingers and articulatory organs during rhythmic sequences; improved planning and programming of hand movements and coarticulatory transitions between articulatory positions; increased speed and smoothness of manual and articulatory movements; and a reduction in delays and errors in the sequence of movements, suggesting improved motor planning. These findings align with the research of J. Iuzzini-Seigel (2022), which revealed that children with CAS and speech sound disorders (SSD) exhibit weaknesses in motor skills tests involving balance, coordination, and precision. The common underlying issue that may explain difficulties with both speech and motor skills supports the conclusions regarding the need for integrated therapy approaches that simultaneously develop both speech and motor skills. This study further reinforces the importance of a comprehensive approach to developing these skills in children with CAS.

The results obtained demonstrate the positive impact of therapy using Playdough games on the development of manual and oral motor skills in preschool children with CAS. Comparing the aforementioned results (strengthening of finger and articulatory muscles, development of proprioceptive sensitivity, improvement in the quality and precision of targeted movements, and coordination between fingers and articulatory organs during rhythmic sequences, etc.) with existing research in the field of speech therapy, particularly the study of E. Maas *et al.* (2014), confirms the effectiveness of motor-based interventions for children with CAS. The study by E. Maas *et al.* (2014) highlights the importance of using the integrated stimulation approach DTTC, which has a strong evidence base for its effectiveness. The proposed approach using Playdough games, which also focuses on motor skills, supports these findings,

adding new dimensions to the development of proprioceptive sensitivity and coordination of movements, which are essential for successful articulation.

The findings of M. Grigos *et al.* (2024) also highlight the effectiveness of DTTC in improving speech sound accuracy in children with CAS, although they employed a different methodology. The participants demonstrated significant improvements in word accuracy following the intervention, consistent with the observations of improved coordination and proprioceptive sensitivity in this study. However, conducted research goes beyond focusing solely on language aspects, also addressing overall motor skill development, providing a more comprehensive approach to CAS therapy. The differences in approaches underscore the importance of using various methods to achieve optimal outcomes, considering the individual needs of each child. Consequently, the results obtained complement existing data on the effectiveness of motor interventions, providing new evidence that Playdough games can serve as a beneficial tool in CAS therapy. This expands the possibilities for integrating different approaches into clinical practice, aiming to optimise individualised treatment plans for children with CAS.

E. Maas *et al.* (2014) also highlight the necessity of applying motor learning principles in CAS therapy. The results obtained complement this data, as the use of Playdough games stimulates not only the physical aspects of motor skills but also the cognitive processes associated with planning and programming movements. This underscores the importance of integrating various aspects of motor learning to achieve optimal outcomes. E. Maas *et al.* (2014) also emphasise the importance of an individualised approach for each child, as there is significant variability in responses to different practice conditions. These findings suggest that therapy using Playdough games can be adapted to meet the individual needs of each child, thus providing a more personalised approach to therapy for children with CAS. It is for this reason that the preparatory stage involves studying each action individually, allowing for a personalised approach and error monitoring. Group work at the final stage enables the transfer of acquired skills to new situations and reinforces their performance, not only through self-monitoring but also by monitoring the performance of other children.

The results obtained indicate a significant improvement in manual and oral motor skills among older preschool children with childhood apraxia of speech (CAS) following therapy with plasticine games. In particular, there was a noted increase in the accuracy of completing tasks, as well as enhancements in the speed and fluidity of articulatory movements, along with improved coordination and intentionality of actions. These findings align with the DIVA/GODIVA model developed by H.E. Miller & F.H. Guenther (2021), which explains motor programming and speech apraxia through neurobiological and computational mechanisms. The DIVA/GODIVA model provides a profound understanding of how disruptions in speech-motor programming can occur due to damage to specific brain structures and the pathways between them. Specifically, this model elucidates how deficits in the speech motor programme may lead to difficulties with the fluidity and accuracy of articulatory movements, as observed in children with CAS. The results demonstrate that therapy involving Playdough games can effectively strengthen these skills, as evidenced by a reduction in difficulties with coarticulatory transitions and an improvement in the fluidity of movements, ultimately contributing to enhanced overall speech production in children with childhood apraxia of speech.

In a study conducted by M.E. Vuolo & C. Wisler (2022), it was found that children with a history or current diagnosis of childhood apraxia of speech (CAS) exhibited deficits in manual rhythmic skills, similar to their speech deficits. Overall, this supports the hypothesis of the existence of domain-general cognitive mechanisms underlying rhythmic skill deficits in children with CAS. The current study complements this picture, demonstrating that the use of Playdough games contributes to improvements in both oral motor skills and manual skills in this group of children. A significant increase in task accuracy, improved coordination of movements, and a reduction in errors were observed in children who received therapy using Playdough games, highlighting its effectiveness.

The results obtained demonstrate the effectiveness of therapy using Playdough games in developing oral motor and manual skills in children with CAS. The significant improvement in accuracy, smoothness, and coordination of movements, observed in the experimental group, highlights the importance of integrating motor and cognitive aspects into the intervention process. Simultaneously, the stable results of the control group indicate the limited effectiveness of traditional intervention methods. Thus, the proposed approach can be recommended as an effective tool for comprehensive CAS therapy, complementing existing methods and expanding the possibilities for individualising intervention programs. This study underscores the need for further research and the practical implementation of Playdough games in working with children who have speech disorders, to improve their oral motor and manual skills.

CONCLUSIONS

The results of the experiment indicate positive changes in the development of manual and oral motor skills among children who participated in the therapy compared to those who did not receive such intervention. Children in the experimental group demonstrated a high level of proficiency in manual skills, exhibiting greater accuracy and concentration in their movements, along with a reduction in the number of errors and delays. Their movements became more differentiated, indicating an improvement in motor control. In terms of oral motor skills, the children in the experimental group showed higher accuracy and speed in executing articulatory movements, as well as a decrease in the number of errors. In the control group, such changes were only minimal, further confirming the effectiveness of Playdough games in developing these skills. The therapy incorporating Playdough games facilitated improvements

in both manual and oral motor skills among children with CAS, thereby confirming its efficacy. The obtained results underline the importance of developing these skills when working with speech disorders. The active use of Playdough games contributed to enhancing accuracy and concentration in children with CAS during motor programmes, enabling them to articulate sounds, words, and sentences more clearly, improve their communication skills, and boost their confidence in their communicative abilities.

The author's Playdough therapy is multifaceted as it takes a comprehensive approach to the development of a child with CAS, simultaneously impacting manual and oral praxis, which contributes to better coordination and motor skills. The playful nature of the therapy makes it interesting and engaging for children, increasing their motivation to learn and reducing age-related differences in motor development among children with CAS. This can be significant for inclusive practices in preschool institutions, where it is necessary to provide equal developmental opportunities for all children, regardless of their individual needs and characteristics. Due to its multifaceted nature, it saves both the child and the speech therapist's resources, while the simultaneous development of various skills in a child with CAS contributes to faster results. In the current conditions of resource scarcity, Playdough games are an accessible and easy-to-use tool not only for speech therapists but also for parents (or other adults) who have undergone appropriate training. Thus, the multifaceted nature of the author's Playdough therapy makes it an effective, motivating, and flexible tool for developing motor and speech skills in children with CAS.

The study holds practical value, as the findings can be applied during therapy for preschool children with CAS in both special and inclusive educational institutions, thereby promoting the use of innovative methodologies in pedagogical practice. Therefore, the results obtained confirm the effectiveness of using Playdough games to develop manual and oral motor skills when working with children with speech disorders. This has significant implications for determining approaches to the diagnosis and therapy of children with CAS, as well as for further scientific research to expand the content of the methodology and its implementation in preschool institutions.

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CONFLICT OF INTEREST

None.

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Вплив Playdough games на розвиток орально-моторних навичок у дітей дошкільного віку із дитячою апраксією мовлення

Анотація. Актуальними викликами є застосування інноваційних підходів, які дозволяють зберігати ресурс логопеда і дитини, але разом з тим вирішувати декілька завдань логокорекційної роботи. Саме такий підхід використали автори статті для формування орально-моторних навичок, які мають вирішальне значення для розвитку мовлення дошкільників, особливо для дітей із дитячою апраксією мовлення. Метою роботи стала перевірка ефективності використання розробленої авторської терапії із застосуванням Playdough games в роботі з дошкільниками, які мають дитячу апраксію мовлення. Дослідження мало контрольований дизайн з повторними вимірами. Первинне логопедичне заключення CAS було сформульоване на основі клінічної оцінки. Порівняльне оцінювання двох обраних груп (контрольної та експериментальної) здійснювалося на основі розробленої методики діагностики стану сформованості manual and oral motor skills у дітей дошкільного віку до та після проведення авторської терапії із застосуванням Playdough games. Дослідниками у ході експерименту було виявлено, що систематичне використання, запропонованих ними авторських ігор з тістом позитивно вплинуло на розвиток рухових навичок у дітей з CAS. Діти експериментальної групи, які брали участь у терапії з Playdough games, продемонстрували значне покращення рухових навичок (як ручних, так і оральних), точності та зосередженості при виконанні рухів, підвищення точності та швидкості артикуляційних рухів. Знизилась кількість затримок та неправильного порядку рухів під час виконання послідовності рухів пальців. Діти потребували менше додаткового часу і значно рідше звертались по допомогу до логопеда, підвищилась вправність пальців рук та покращились їх диференціації під час виконання проб, що вказує на позитивний вплив використання в роботі тіста. Підвищились показники: перехід від однієї артикуляційної позиції до іншої, що допомагало дітям уникати труднощів з коартикуляційними переходами; планування послідовності рухів; плавності переходів між звуками та складами. Практичне значення роботи полягає в ефективності використання Playdough games для значного покращення орально-моторних навичок, точності рухів і концентрації у дітей з дитячою апраксією мовлення, що дозволяє зменшити потребу в додатковій допомозі логопеда

Ключові слова: ігри з пластиліном; порушення мовлення; моторні функції; ефективність; формувальна методика