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EFFECTIVENESS OF A MULTIMODAL PHYSICAL REHABILITATION PROGRAM IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

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Abstract.

Autism spectrum disorders belong to the group of neurodevelopmental conditions characterized by deficits in social interaction and communication, together with impairments in motor, sensory, and psychoemotional development. Children with autism spectrum disorders frequently demonstrate reduced motor coordination, balance disturbances, insufficient development of fine motor skills, and sensory hyper- or hyposensitivity, all of which significantly limit their adaptation and participation in everyday activities. In this context, the search for and scientific substantiation of effective physical rehabilitation programs capable of exerting a comprehensive influence on the psychophysical state of this population therefore remains highly relevant.

Aim. *To develop and evaluate the effectiveness of a comprehensive physical rehabilitation program aimed at improving motor, cognitive, and social-adaptive outcomes in children with autism spectrum disorders.*

Materials and Methods. *The study involved 20 children aged 5 to 10 years diagnosed with autism spectrum disorders who were divided into a control group and an experimental group. The comprehensive physical rehabilitation program included therapeutic physical exercises, hydrotherapy, various types of massage incorporating elements of Su Jok therapy, and occupational therapy interventions. Rehabilitation sessions were conducted according to an individualized structured plan that took into account the sensory and psychoemotional characteristics of each child. Program effectiveness was assessed through comparative analysis of indicators of motor function, balance, movement coordination, fine motor skills, together with behavioral and social changes recorded at the initial and final stages of the study. The study was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki (1964-2024) following receipt of written informed consent from all parents or legal guardians of children. Quantitative data were processed by calculating the arithmetic mean and standard error of the mean ($M \pm m$) using SPSS Statistics 22.0 (IBM, USA). Intergroup differences were assessed using a statistical significance threshold of $p \leq 0.05$. The study was formed part of the initiative research project of the Department of Physical Therapy and Occupational Therapy of Kherson State University entitled «Technologies of Physical Therapy and Occupational Therapy in Clinical and Sports Medicine» (State Registration No. 0123U102176).*

Results. *Children in the experimental group demonstrated improvements in gross and fine motor skills, balance, and movement coordination, although no statistically significant differences were identified compared to the control group. Positive changes were also observed in reduced anxiety levels, improved emotional stability, formation of a more positive attitude toward tactile contact, and increased social activity. Occupational therapy sessions contributed to the development of cognitive functions, concentration of attention, visual-spatial thinking, and everyday independence skills essential for daily functioning. The inclusion of hydrotherapy exerted an additional positive effect on the psychoemotional state, reduction of motor stereotypies, and social adaptation, thereby enhancing the overall effect of the comprehensive rehabilitation approach.*

Conclusions. *The comprehensive physical rehabilitation program represents an effective intervention for correction of psychophysical impairments in children with autism spectrum disorders. Its implementation promotes harmonious development of motor, cognitive, and social functions and improves adaptation to everyday life. The obtained results substantiate the feasibility of broader application of integrated physical and sensorimotor approaches in rehabilitation practice.*

Keywords: *Autism Spectrum Disorders; Physical Rehabilitation; Comprehensive Rehabilitation Programs; Motor Development; Psychosocial Adaptation.*

Introduction

According to the World Health Organization, children's mental health has significantly deteriorated over recent decades. Research indicates that approximately one in five children worldwide experiences mental, cognitive, emotional, or physical difficulties affecting their overall development and social adaptation. In European countries, mental disorders are diagnosed in every fourth or fifth child, whereas in Ukraine more than 227,000 children and adolescents receive psychiatric care, highlighting the national significance of this issue [1, 2].

Children with autism spectrum disorders (ASD) constitute an increasing focus of attention among specialists

because of the rising prevalence of these disorders. Autism affects about 21-26 individuals per 10,000 population, which makes it a significant public health concern. Management of autism requires a multidisciplinary approach involving psychiatrists, pediatricians, psychologists, rehabilitation specialists, and educators [3]. Several countries have introduced governmental programs aimed at supporting children with ASD, indicating the priority assigned to autism by healthcare and education systems [4].

Parents often notice manifestations of early childhood autism during the first two years of life. This condition is characterized by delayed speech development, impaired social interaction, and specific behavioral patterns. Although

manifestations of autism are not always physiological in nature, behavioral analysis enables the timely identification of developmental difficulties. Early diagnosis and comprehensive rehabilitation for children with ASD remain essential because timely interventions significantly improve developmental outcomes, social skills, and quality of life [5].

Insufficient understanding of the challenges associated with raising children with autism, limited availability of effective rehabilitation interventions, and low parental awareness may lead to serious consequences for child development [6]. The family therefore plays a crucial role because parents create an environment that facilitates the development of both communicative and motor skills and promotes socialization. Active parental involvement in specialized physical rehabilitation programs enables effective integration of motor, cognitive, and social skill development [7].

Children with ASD frequently experience a combination of motor and sensory impairments that significantly affect their functional independence. Studies indicate that 50-88% of children with ASD exhibit significant motor difficulties. Sensory disturbances are also common, including hyper- or hypo-sensitivity to light, sound, touch, or movement, which complicates environmental adaptation and may limit physical activity. These characteristics emphasize the need for targeted rehabilitation programs aimed at correcting sensory integration and motor development deficits [8].

Physical activity represents an essential component of comprehensive care for children with autism. A growing body of evidence indicates that regular physical exercise improves motor skills, reduces anxiety, enhances behavioral regulation and attention, promotes social interaction, stimulates neuroplasticity, facilitates adaptive skills, and ultimately improves the child's quality of life [9, 10].

Physical rehabilitation serves as a key component of interdisciplinary support for children with ASD because it addresses motor, postural, and sensory impairments directly affecting learning, communication, and self-care abilities. Rehabilitation programs include therapeutic exercise, occupational therapy, sensory integration, balance and coordination training, together with therapeutic activities such as swimming or hippotherapy [11]. Contemporary studies demonstrate that combining traditional interventions with modern technologies, including virtual reality, interactive simulators, and motion-based gaming platforms, increases motivation and intervention effectiveness [12]. Physical rehabilitation therefore constitutes an integral component of support for children with autism and significantly influences long-term developmental outcomes.

The increasing prevalence of ASD and the growing demand for evidence-based rehabilitation approaches necessitate further scientific investigation of the effectiveness of physical rehabilitation aimed at motor, sensory, and socio-emotional development. Despite the considerable number of existing studies, issues related to the selection of optimal technologies, individualization of programs, and integration of traditional and innovative interventions remain relevant. Applied research in this field therefore has substantial practical significance because it enables adaptation of rehabilitation methodologies to the actual needs of Ukrainian children with ASD [13].

Aim. To develop an individualized physical rehabilitation program for children with autism and to assess its impact on the development of gross and fine motor skills, coordination, cognitive functions, and social adaptation.

Materials and Methods. The study included 20 children aged 5 to 10 years (mean age 6.55 ± 1.43 years) with a clinically confirmed diagnosis of ASD. Participants were randomized into two groups: experimental group (n=10): children who underwent a specialized physical rehabilitation program; control group (n=10): children who received standard educational and rehabilitation support without inclusion of physical exercises.

Physical rehabilitation was conducted at specialized rehabilitation centers in Ivano-Frankivsk and Poltava from 2024 to 2025. The rehabilitation course lasted 12 weeks, during which the experimental group participated in a comprehensive program aimed at improving motor skills, coordination, balance, and sensory integration.

The 12week rehabilitation duration was chosen based on evidence that this period is sufficient for stable improvements in motor, cognitive, and social outcomes in children with ASD [14]. The study aimed to assess baseline characteristics, develop and implement a program targeting motor skills, sensory integration, and social adaptation, compare pre and postintervention outcomes, and analyze the relationship between physical activity and cognitive/social performance. The 12week program included: (1) sensorimotor exercises for balance and coordination; (2) aerobic activities; (3) playbased group tasks for social interaction; and (4) relaxation techniques for stress reduction and selfregulation, thereby targeting motor, sensory, and psychosocial domains.

Diagnostic Methods. A comprehensive multidisciplinary approach covered physical, motor, cognitive, emotional, and social domains. Muscle tone was assessed with the Modified Ashworth Scale (mAS; scores 0-5, averaged). Balance and motor planning were evaluated using the Romberg test, fingertonose test, singleleg stance, and straightline walking. Visualmotor integration was measured with the Bender Gestalt Test, intellectual development with the Binet-Simon test (ages 3-15), and ASD severity with the Childhood Autism Rating Scale (CARS) and a 30item ASD checklist [15].

Ethical Considerations. The study was conducted in compliance with the principles of the World Medical Association Declaration of Helsinki (1964-2024), which defines ethical standards for medical research involving human participants.

All parents or legal guardians of the participating children provided written informed consent for their participation in the study, which included information concerning the objectives, interventions, expected outcomes, and potential risks. Children received physiotherapeutic and rehabilitation interventions within safe, individually tailored programs adapted to their specific needs.

This study formed part of the initiative research project of the Department of Physical Therapy and Occupational Therapy of Kherson State University entitled «Technologies of Physical Therapy and Occupational Therapy in Clinical and Sports Medicine» (State Registration No. 0123U102176).

Results and Discussion

Initial analysis of medical records and structured interviews with parents/teachers provided detailed information regarding each child's development, behavior, and functional status. Comprehensive health assessment, including electroencephalography, was performed to evaluate central nervous system functioning and exclude contraindications for physical activity.

The study proceeded in stages: selection of children without medical contraindications followed by development of individualized rehabilitation programs taking into account age, physical development, motor and sensory characteristics, and psychosocial needs. Sessions were conducted according to a standardized schedule.

The experimental group received physiotherapeutic procedures, specialized exercises aimed at coordination, balance, and postural control, massage intended to normalize muscle tone, elements reflexotherapy, and speech therapy interventions for development of communication skills.

Complex Exercise and Rehabilitation Techniques. Physical therapy (therapeutic exercises) was conducted three times per week (25-35 min) to strengthen major muscle groups, improve coordination, and develop fundamental motor skills, which were subsequently integrated into aquatic therapy.

Hydrokinesiotherapy. Weekly 20-40 min group aquatic sessions, including typically developing children, facilitated social adaptation, communication, emotional stability, and reduction of anxiety. Initial familiarization with water and basic skills, including submersion and movement in the pool, contributed to overcome fear. Subsequent stages included floating, gliding, breathing exercises, leg movements, and breaststroke coordination.

Massage, Hydrokinesiotherapy, and SuJok Therapy. Ten massage sessions performed in the prone position (15-30 min) incorporated elements of SuJok therapy involving active zones of the hands and feet. Massage

contributed to strengthening of the musculoskeletal, nervous, and cardiovascular systems, improvement of postural control, reduction of anxiety, formation of a positive attitude toward tactile contact, and enhancement of speech. Combination with hydrokinesiotherapy increased strength, flexibility, and coordination, reduced tension, improved mood and selfconfidence, facilitated adaptation to group activities, and increased social activity. Su Jok therapy contributed to normalization of functional status and increased muscle tone, confirming the effectiveness of this combination for psychophysical development and social integration.

Occupational Therapy. Occupational therapy improved cognitive and motor development, particularly visual memory and visuospatial thinking. The «Stencils» exercise, aimed at identifying objects by contour, improved reproduction of shapes and images from memory, especially in girls. Puzzlebased interventions involving assembling pictures from separate parts improved visuospatial thinking and attention; children learned to form complete mental images, which facilitated generalization and analytical thinking. The «Professions» activity contributed to development of analytical skills, logical reasoning, and relational thinking. Occupational therapy also improved motor endurance, fine motor skills, and independence in activities of daily living, confirming its important role in comprehensive ASD rehabilitation.

Analysis and Interpretation of Results. Baseline assessment of both groups identified psychophysical status and areas requiring rehabilitation intervention. Testing performed at baseline, midpoint, and completion of the study enabled assessment of dynamic changes. Comparative analysis confirmed group homogeneity (Table 1), with similar results obtained on motor aptitude scale, balance tests, and coordination assessments, thereby ensuring equal conditions evaluation of program effectiveness.

Table 1

Baseline cumulative motor function scores (M±m)

Indicators	CG	EG	p-value
Motor aptitude scale	6.45 ± 1.10	6.80 ± 1.15	>0.05
Balance test	29.2 ± 2.45	27.5 ± 2.40	>0.05
Coordination test	1.42 ± 0.30	1.39 ± 0.28	>0.05

Note: CG – Control Group; EG – Experimental Group. M±m – mean value ± standard error of the mean; p – level of statistical significance for intergroup comparisons.

At baseline, children in both groups exhibited underdeveloped fine motor skills, low endurance, difficulties with attention, and moderate emotional disturbances.

After completion of the rehabilitation program, the experimental group demonstrated improvements in gross and fine motor skills, movement coordination, and cognitive abilities, although no statistically significant between-group differences were identified compared with the control group (Table 2).

Statistical Analysis and Interpretation of Results. The obtained quantitative data are presented as mean values and standard error of the mean (M ± m). Intergroup comparisons of motor function indicators between the control and experimental groups were performed using statistical tests with a significance threshold of $p \leq 0.05$.

At baseline, no statistically significant differences were identified between the experimental and control groups in the assessed parameters ($p > 0.05$), indicating group comparability and homogeneity.

After the 12-week program, the experimental group demonstrated greater improvements in motor skills, balance, and coordination compared with baseline values, although between-group differences did not reach statistical significance ($p > 0.05$, Tables 1, 2). Despite this, the observed improvements suggest clinically relevant positive dynamics, including enhanced motor performance, functional independence, and social engagement. Considering the pilot nature of the study, the findings should be regarded as preliminary and indicate the need for larger randomized trials.

Table 2

Cumulative motor function scores at the end of the study (M±m)

Indicators	CG	EG	p-value
Motor aptitude scale	11.20 ± 1.30	16.0 ± 1.50	>0.05
Balance test	35.5 ± 2.40	42.0 ± 2.70	>0.05
Coordination test	5.0 ± 0.50	8.5 ± 1.50	>0.05

Note: CG – Control Group; EG – Experimental Group M±m – mean value ± standard error of the mean; p – level of statistical significance for intergroup comparisons.

The experimental program included structured exercises, play activities, massage, hydrotherapy, and Su Jok therapy, whereas the control group received standard support without targeted physical interventions. Standard care primarily influenced emotional aspects, whereas the comprehensive program was associated with broader functional improvements involving motor, cognitive, psychosocial domains. Systematic rehabilitation improved fine motor skills, coordination, attention, adaptive functioning, confidence, social interaction, reduced sensory sensitivity, and improved sleep and appetite.

Comprehensive individualized physical rehabilitation may therefore exert a positive influence on multiple domains in children with ASD. Despite nonsignificant between-group differences, the observed trends support the clinical relevance of this approach and its implementation in specialized settings while emphasizing the need for further largescale studies.

The absence of statistically significant between-group differences should be interpreted considering the pilot nature of the study rather than as evidence of ineffectiveness of the intervention. The small sample size and heterogeneity of ASD may have limited the statistical power required to detect significant intergroup effects. Positive trends identified in motor, cognitive, and psychosocial domains nevertheless suggest clinically meaningful benefits of the comprehensive rehabilitation program. These findings are consistent with published data demonstrating that multidimensional interventions combining physical, sensory, and play-based components can produce favorable outcomes across multiple domains in children with ASD, even in the absence of statistical significance in small-scale studies. The obtained results should therefore be regarded as preliminary yet promising because they support the feasibility and potential effectiveness of the intervention and provide a rationale for future large-scale randomized controlled trials with adequate statistical power, standardized protocols, and long-term follow-up.

Our rehabilitation program improved balance, coordination, and motor performance, which is consistent with randomized studies demonstrating that targeted physical interventions improve gross motor competence in children with ASD compared with standard care [16]. Meta-analyses confirm moderatetolarge effects on fundamental motor skills [17]. Systematic reviews, including those by Ruggeri et al. [18], Xing et al. [19], and Wang et al. [20], support positive motor outcomes but note lowtomoderate quality of evidence attributable to heterogeneity and small samples which is consistent with our findings.

Positive changes were also observed in cognition, attention, and social interaction, corresponding to

evidence that integrated motorsensory interventions affect both physical and psychosocial domains [21, 22]. Although metaanalyses of sensory integration demonstrate inconsistent statistical significance, individual studies report improvements in social reciprocity and participation, suggesting multidomain effects and emphasizing the need for larger studies [21, 23].

Hydrokinesiotherapy improved motor function together with emotional stability and social adaptation, which is consistent with studies demonstrating improved functional adaptation, social competence, and quality of life after aquatic interventions [24]. Systematic reviews also confirm beneficial effects on social behavior despite methodological limitations. Our results are consistent with evidence indicating that physical activity reduces repetitive behaviors and improves cognitive control [22, 25]. Mindbody interventions, including yoga, additionally support integration into rehabilitation programs [26].

Despite positive outcomes, the evidence base, including our study, remains limited by small samples, heterogeneous protocols, variable intervention duration, and insufficient followup, limitations also reported by Wang et al., Cai et al., and Kou et al. [9, 20, 27]. Our findings support the use of comprehensive physical rehabilitation for improvement of motor, cognitive, and sociobehavioral outcomes in children with ASD while emphasizing the need for rigorous standardized research.

Conclusions

1. The conducted study demonstrated that the developed comprehensive physical rehabilitation program is associated with positive changes in the psychophysical status of children with ASD. Children in the experimental group demonstrated improvements in gross and fine motor skills, movement coordination, balance together with cognitive and socio-communicative functions, which are clinically meaningful.

2. Combination of traditional physical rehabilitation interventions, including therapeutic exercises, hydrokinesiotherapy, and massage, with additional approaches, including occupational therapy, Su Jok therapy, and play-based and sensory-motor tasks, provides a multidirectional effect on the motor, sensory, and psychosocial components of development in children with ASD and supports improvement of functional participation and social adaptation.

3. The effectiveness of the rehabilitation program is largely determined by individualization of interventions taking into account the sensory, motor, and psychosocial characteristics of each child together with active parental involvement in observation, support, and adaptation of the program.

4. The obtained results indicate the feasibility of implementing comprehensive physical rehabilitation programs in rehabilitation practice for children with ASD. Limitations of the study, particularly the small sample size, nevertheless indicate the need for further large-scale longitudinal studies to confirm the effectiveness of individual components of the program and to develop standardized intervention protocols.

Prospects for further research and practical significance. The practical significance of the obtained results lies in potential application of these findings in rehabilitation centers, specialized educational institutions, and by parents of children with autism. The proposed rehabilitation programs may improve the effectiveness of physical rehabilitation and facilitate adaptation of children to social environments. The findings may serve as a foundation for future research in the field of physical rehabilitation for individuals with autism.

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and interpretation of the results, manuscript preparation, final approval of the manuscript; S. Danylchenko – concept and design of the study, manuscript editing, final approval of the manuscript; I. Golovchenko – analysis and interpretation of the results, final approval of the manuscript; V. Shevchenko – statistical processing and interpretation of data, final approval of the manuscript; S. Kucherenko – analysis and interpretation of the results, final approval of the manuscript; A. Shevchenko – concept and design of the study, writing or critical editing of the article, final approval of the manuscript.

Conflict of interest. The authors declare no conflict of interest.

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References:

1. World Health Organization. Improving the mental and brain health of children and adolescents. WHO[Internet]. [cited 2026 Feb 18]. Available from: <https://www.who.int/activities/improving-the-mental-and-brain-health-of-children-and-adolescents>
2. World Health Organization. Informing new training resources for child and adolescent mental health. WHO[Internet]. 2024 [update 2025 Mar 31; cited 2026 Mar 2]. Available from: <https://www.who.int/news-room/articles-detail/informing-the-new-training-resources-for-child-and-adolescent-mental-health>
3. Maenner MJ, Shaw KA, Baio J, Ed S, Washington A, Patrick M, DiRienzo M, et al. Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years – Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2016. *MMWR Surveill Summ.* 2020;69(4):1-12. DOI: <https://doi.org/10.15585/mmwr.ss6904a1>
4. World Health Organization. Autism. WHO[Internet]. 2025 [cited 2026 Feb 18]. Available from: <https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders>
5. Vanegas Navarro P, Apuy Rodríguez F, Arias Alvarado MJ, Chacón Quirós M. Early Diagnosis and Intervention for Autism Spectrum Disorder. *Cureus.* 2025;17(8): e89591. DOI: <https://doi.org/10.7759/cureus.89591>
6. World Health Organization. Mental Health, Brain Health and Substance Use. WHO [Internet]. [cited 2026 Mar 18]. Available from: <https://www.who.int/teams/mental-health-and-substance-use/treatment-care/who-caregivers-skills-training-for-families-of-children-with-developmental-delays-and-disorders>
7. Conrad CE, Rimestad ML, Rohde JF, Petersen BH, Korfitsen CB, Tarp S, et al. Parent-Mediated Interventions for Children and Adolescents with Autism Spectrum Disorders: A Systematic Review and Meta-Analysis. *Front Psychiatry.* 2021;12:773604. DOI: <https://doi.org/10.3389/fpsy.2021.773604>
8. Kangarani-Farahani M, Malik MA, Zwicker JG. Motor Impairments in Children with Autism Spectrum Disorder: A Systematic Review and Meta-analysis. *J Autism Dev Disord.* 2024;54(5):1977-97. DOI: <https://doi.org/10.1007/s10803-023-05948-1>
9. Cai B, Miao Y, Zhao J, Ying X, Lin W. The Effect of Exercise Intervention on Cognitive Function and Quality of Life With Autism Spectrum Disorder: A Systematic Review and Meta-Analysis. *Actas Esp Psiquiatr.* 2025;53(4):839-56. DOI: <https://doi.org/10.62641/aep.v53i4.2040>
10. Nesterenko VG, Shevchenko AS, Zelenska KO, Hryhorov MM. Kliniko-epidemiolohichni kharakterystyky invalidyzuiuchykh nevrolohichnykh zakhvoriuvan (literaturnyi ohliad) [Clinical and epidemiological characteristics of disabling neurological diseases (literature review)]. *International Neurological Journal.* 2024;20(4):176-84. DOI: <https://doi.org/10.22141/2224-0713.20.4.2024.1079> (in Ukrainian)
11. Doernberg EA, Russ SW, Dimitropoulos A. Believing in Make-Believe: Efficacy of a Pretend Play Intervention for School-Aged Children with High-Functioning Autism Spectrum Disorder. *J Autism Dev Disord.* 2021;51(2):576-88. DOI: <https://doi.org/10.1007/s10803-020-04547-8>
12. Altın Y, Bosnak O, Turhan C. Examining Virtual Reality Interventions for Social Skills in Children with Autism Spectrum Disorder: A Systematic Review. *J Autism Dev Disord.* 2025. DOI: <https://doi.org/10.1007/s10803-025-06741-y>
13. Basenko LI, Tymruk-Skoropad KA. Simeino oriientovana prohrama fizychnoi terapii dlia ditei iz rozladamy autystychnoho spektra [Family-oriented physical therapy program for children with autism spectrum disorders]. *Art of Medicine.* 2024;3:189-95. <https://doi.org/10.21802/artm.2024.3.31.189> (in Ukrainian)
14. Li Y, Feng Y, Zhong J, Zou Zh, Lan W, Shen Y, et al. The Effects of Physical Activity Interventions in Children with Autism Spectrum Disorder: a Systematic Review and Network Meta-analysis. *Rev J Autism Dev Disord.* 2025;12:651-65. DOI: <https://doi.org/10.1007/s40489-023-00418-x>
15. Roşca AM, Rusu L, Marin MI, Ene Voiculescu V, Ene Voiculescu C. Physical Activity Design for Balance Rehabilitation in Children with Autism Spectrum Disorder. *Children.* 2022;9(8):1152. DOI: <https://doi.org/10.3390/children9081152>

16. Castano PRL, Suarez DPM, Gonzalez ER, Robledo-Castro C, Hederich-Martínez C, Cadena HPG, et al. Effects of Physical Exercise on Gross Motor Skills in Children with Autism Spectrum Disorder. *J Autism Dev Disord.* 2024;54(8):2816-25. DOI: <https://doi.org/10.1007/s10803-023-06031-5>
17. Ji YQ, Tian H, Zheng ZY, Ye ZY, Ye Q. Effectiveness of exercise intervention on improving fundamental motor skills in children with autism spectrum disorder: a systematic review and meta-analysis. *Front Psychiatry.* 2023;14:1132074. DOI: <https://doi.org/10.3389/fpsy.2023.1132074>
18. Ruggeri A, Dancel A, Johnson R, Sargent B. The effect of motor and physical activity intervention on motor outcomes of children with autism spectrum disorder: A systematic review. *Autism.* 2020;24(3):544-68. DOI: <https://doi.org/10.1177/1362361319885215>
19. Xing Y, Wu X. Effects of Motor Skills and Physical Activity Interventions on Motor Development in Children with Autism Spectrum Disorder: A Systematic Review. *Healthcare (Basel).* 2025;13(5):489. DOI: <https://doi.org/10.3390/healthcare13050489>
20. Wang Y, Qian G, Mao S, Zhang S. The impact of physical exercise interventions on social, behavioral, and motor skills in children with autism: a systematic review and meta-analysis of randomized controlled trials. *Front Pediatr.* 2025;13:1475019. DOI: <https://doi.org/10.3389/fped.2025.1475019>
21. Wen L, Wu Z. The impact of sensory integration based sports training on motor and social skill development in children with autism spectrum disorder. *Sci Rep.* 2025;15(1):19974. DOI: <https://doi.org/10.1038/s41598-025-05393-3>
22. Suarez-Manzano S, Ruiz-Ariza A, de Loureiro NEM, Martínez-Lopez EJ. Effects of Physical Activity on Cognition, Behavior, and Motor Skills in Youth with Autism Spectrum Disorder: A Systematic Review of Intervention Studies. *Behav Sci (Basel).* 2024;14(4):330. DOI: <https://doi.org/10.3390/bs14040330>
23. Oh S, Jang JS, Jeon AR, Kim G, Kwon M, Cho B, et al. Effectiveness of sensory integration therapy in children, focusing on Korean children: A systematic review and meta-analysis. *World J Clin Cases.* 2024;12(7):1260-71. DOI: <https://doi.org/10.12998/wjcc.v12.i7.1260>
24. Gueita-Rodríguez J, Ogonowska-Słodownik A, Morgulec-Adamowicz N, Martín-Prades ML, Cuenca-Zaldívar JN, Palacios-Cena D. Effects of Aquatic Therapy for Children with Autism Spectrum Disorder on Social Competence and Quality of Life: A Mixed Methods Study. *Int J Environ Res Public Health.* 2021;18(6):3126. DOI: <https://doi.org/10.3390/ijerph18063126>
25. Wang S, Chen D, Yang Y, Zhu L, Xiong X, Chen A. Effectiveness of physical activity interventions for core symptoms of autism spectrum disorder: A systematic review and meta-analysis. *Autism Res.* 2023;16(9):1811-24. DOI: <https://doi.org/10.1002/aur.3004>
26. Ju X, Liu H, Xu J, Hu B, Jin Y, Lu C. Effect of Yoga Intervention on Problem Behavior and Motor Coordination in Children with Autism. *Behav Sci (Basel).* 2024;14(2):116. DOI: <https://doi.org/10.3390/bs14020116>
27. Kou R, Li Z, Li M, Zhou R, Zhu F, Ruan W, et al. Comparative effectiveness of physical exercise interventions on sociability and communication in children and adolescents with autism: a systematic review and network meta-analysis. *BMC Psychol.* 2024;12(1):712. DOI: <https://doi.org/10.1186/s40359-024-02210-w>

ЕФЕКТИВНІСТЬ КОМПЛЕКСНОЇ ПРОГРАМИ ФІЗИЧНОЇ РЕАБІЛІТАЦІЇ ДІТЕЙ ІЗ РОЗЛАДАМИ СПЕКТРА АУТИЗМУ

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Резюме. zz

Розлади аутистичного спектра належать до групи нейророзвиткових порушень, що характеризуються дефіцитами соціальної взаємодії, комунікації, а також порушеннями моторного, сенсорного та психоемоційного розвитку. У дітей із розладами аутистичного спектру часто спостерігаються зниження координації рухів, порушення рівноваги, недостатній розвиток дрібної моторики, сенсорна гіпер- або гіпочутливість, що обмежує їхню адаптацію та участь у повсякденному житті. У зв'язку з цим актуальним є пошук та наукове обґрунтування ефективних програм фізичної реабілітації, здатних комплексно впливати на психофізичний стан дітей цієї категорії.

Мета дослідження. Розробити та оцінити ефективність комплексної програми фізичної реабілітації, спрямованої на покращення моторних, когнітивних та соціально-адаптаційних показників у дітей із розладами спектра аутизму.

Матеріали та методи. У дослідженні брали участь 20 дітей віком від 5 до 10 років з діагностованими розладами спектра аутизму, які були розподілені на контрольну та експериментальну групи. Комплексна програма фізичної реабілітації включала лікувальну фізичну культуру, гідрокінезотерапію, різні види масажу з елементами су-джок терапії, а також ерготерапевтичні втручання. Заняття проводилися за індивідуалізованим та структурованим планом із урахуванням сенсорних і психоемоційних особливостей дітей. Оцінювання ефективності здійснювалося шляхом порівняльного аналізу показників моторних функцій, рівноваги, координації рухів, дрібної моторики, а також поведінкових і соціальних змін на початковому та фінальному етапах дослідження. Дослідження виконано з дотриманням принципів Гельсінської декларації Всесвітньої медичної асоціації (редакція 2013 року) за умови отримання письмової інформованої згоди від усіх батьків або законних опікунів дітей. Кількісні дані опрацьовано з обчисленням середнього арифметичного та стандартної похибки середнього ($M \pm m$) із використанням програми SPSS Statistics 22.0 (IBM, США). Для оцінки міжгрупових відмінностей застосовували критерій статистичної значущості з пороговим значенням $p \leq 0,05$. Дослідження виконано в межах ініціативного науково-дослідного проєкту кафедри фізичної терапії та ерготерапії Херсонського державного університету «Технології фізичної терапії та ерготерапії в клінічній та спортивній медицині» (державний реєстраційний номер 0123U102176).

Результати дослідження. У дітей експериментальної групи відмічено покращення показників загальної та дрібної моторики, рівноваги й координації рухів; однак статистично значущих відмінностей порівняно з контрольною групою не виявлено.

Позитивна динаміка також спостерігалася у зниженні рівня тривожності, покращенні емоційної стабільності, формуванні позитивного ставлення до тактильного контакту та підвищенні соціальної активності. Ерготерапевтичні заняття сприяли розвитку когнітивних функцій, концентрації уваги, наочно-образного мислення та навичок побутової самостійності, що важливо для адаптації до повсякденного життя. Застосування гідрокінезотерапії мало додатковий позитивний вплив на психоемоційний стан, зменшення рухових стереотипів та соціальну адаптацію дітей, підсилюючи ефект комплексного підходу реабілітації.

Висновки. Комплексна програма фізичної реабілітації є ефективним засобом корекції психофізичних порушень у дітей із розладами спектра аутизму. Її впровадження сприяє гармонійному розвитку моторних, когнітивних і соціальних функцій та підвищує рівень адаптації дітей до повсякденного життя. Отримані результати обґрунтовують доцільність широкого використання інтегрованих фізичних та сенсомоторних підходів у реабілітаційній практиці.

Ключові слова: розлади аутистичного спектра; фізична реабілітація; комплексні реабілітаційні програми; моторний розвиток; психосоціальна адаптація.

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