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Early Intervention Facilitates Neuropsychological Development in Children with Autism and Attention Deficit Hyperactivity Disorder

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Abstract: *Objective:* This study aims to investigate the impact of early intervention on neuropsychological development in children with autism and attention deficit hyperactivity disorder (ADHD), providing effective intervention strategies for clinical practice. *Methods:* A total of 130 children with autism and ADHD who visited the hospital between June 2023 and June 2024 were selected as study subjects and randomly divided into an intervention group and a control group, with 65 children in each group. The intervention group received a one-year early comprehensive intervention, including behavioral therapy, cognitive training, and family guidance, while the control group only received routine medical care. The neuropsychological development assessment scale was used to evaluate both groups before and after the intervention to compare changes in their neuropsychological development levels. *Results:* Children in the intervention group showed significant improvements in cognitive function, social skills, language ability, and attention concentration, with an average improvement score of 23.5 points. Children in the control group did not show significant improvements in these areas, with an average improvement score of only 5.8 points. The difference between the two groups was statistically significant ($P < 0.05$). *Conclusion:* Early comprehensive intervention has a significant promoting effect on the neuropsychological development of children with autism and ADHD. Targeted behavioral therapy, cognitive training, and family guidance can effectively enhance children's cognitive, social, language, and attention abilities, laying a solid foundation for their future overall development. Therefore, it is recommended to actively promote and apply early intervention strategies in clinical practice.

Keywords: Early intervention; Autism; Attention deficit hyperactivity disorder (ADHD); Neuropsychological development; Comprehensive intervention strategies

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1. Introduction

Autism and ADHD are common neurodevelopmental disorders in children that significantly impact cognitive, social, language, and attention abilities, potentially affecting their quality of life and long-term development.

In recent years, early intervention's role in the rehabilitation of children with autism and ADHD has gained increasing attention. This study aims to explore the specific effects of a one-year comprehensive early intervention on the neuropsychological development of children with autism and ADHD. The study employs diverse intervention methods, including behavioral therapy, cognitive training, and family guidance, with the goal of improving cognitive, social, language, and attention abilities, ultimately enhancing the quality of life. The results of this study will provide strong evidence for clinical practice, helping to optimize early intervention strategies for children with autism and ADHD, and promoting their all-round development, which has significant theoretical and practical implications.

2. Materials and methods

2.1. General information

This study selected 130 children with autism and ADHD from June 2023 to June 2024 in our hospital. All the children were diagnosed by professional doctors and met the clinical diagnostic criteria for autism or ADHD. Children were randomly divided into an intervention group and a control group, with 65 cases in each group. In the intervention group, there were 42 boys and 23 girls, ranging in age from 3 to 10 years, with an average age of 6.5 ± 2.1 years. Among them, 35 children had autism and 30 had ADHD (some children showed both symptoms, so the total exceeds 65, but they are classified according to the main diagnosis). In the control group, there were 40 boys and 25 girls, ranging in age from 3 to 11 years, with an average age of 6.8 ± 2.3 years. Among them, 33 children had autism and 32 had ADHD. There was no significant difference in sex, age, and disease distribution between the two groups ($P > 0.05$), making them comparable [1].

2.2. Inclusion and exclusion criteria

Inclusion criteria included: (1) meeting the clinical diagnostic criteria for autism or ADHD [2]; (2) ages between 3 and 11 years; (3) parents or legal guardians agreeing to participate in the study and signing the informed consent form. Exclusion criteria included: (1) severe mental retardation, epilepsy, cerebral palsy, or other nervous system diseases; (2) receiving other special treatments for autism or ADHD that could affect the study's outcome evaluation; (3) parents or legal guardians not agreeing to participate in the study.

2.3. Methods

Children in the intervention group received a one-year comprehensive early intervention, including:

(1) Behavioral therapy: Cognitive behavioral therapy to help children learn social skills, emotional management, and self-regulation through games and activities [3].

(2) Cognitive training: Personalized cognitive training plans based on each child's cognitive development level, including attention training, memory training, and thinking training.

(3) Family guidance: Training and guidance for parents to understand autism and ADHD, master family intervention methods and skills, and establish a good parent-child relationship [3].

Children in the control group only received routine medical care, including regular follow-ups, medication (if necessary), and general health guidance [4].

2.4. Observation indicators

This study selected the following five observation indicators to comprehensively evaluate the impact of early intervention on the neuropsychological development of children with autism and ADHD:

(1) Cognitive function: Assessed using the Wechsler Intelligence Scale for Children (WISC-IV), including scores in verbal comprehension, perceptual reasoning, working memory, and processing speed.
(2) Social skills: Evaluated using the children's Social Skills Rating Scale (SSRS), including cooperation and sharing, communication and expression, and emotional understanding and regulation [5].
(3) Language ability: Assessed using the Peabody Picture Vocabulary Test (PPVT), evaluating scores in vocabulary comprehension, expression, and application [6].
(4) Attention concentration: Assessed using the attention part of the Attention Deficit Hyperactivity Disorder Rating Scale (ADHDRS), recording scores in attention concentration, persistence, and distraction.
(5) Quality of life: Evaluated using the Pediatric Quality of Life Inventory (PedsQL), including scores in physical health, emotional function, social function, and school performance. Parents filled out the form based on the child's situation over the past month [7].

2.5. Statistical analysis

SPSS 26.0 statistical software was used for data analysis. Measurement data were expressed as the mean ± standard deviation (SD), and differences between the two groups before and after intervention were compared using the t-test. Counting data were represented as percentages (%), and differences in gender and disease distribution between the two groups were compared using the χ^2 test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Cognitive function

Significant progress was observed in the cognitive function of the intervention group. Assessed using the Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV), notable improvements were found in the intervention group's scores in verbal comprehension, perceptual reasoning, working memory, and processing speed. Specifically, the average score of the intervention group increased from 85.6 before the intervention to 109.1 after the intervention, a gain of 23.5 points. In contrast, the average score of the control group only rose from 84.9 to 87.8, an increase of 2.9 points. The difference between the two groups was statistically significant ($t = 10.34$, $P < 0.05$). See **Table 1**.

Table 1. Comparison of cognitive function scores between intervention and control groups

Group	Before intervention	After intervention	Improvement score	*t*-value	*P*-value
Intervention	85.6	109.1	23.5	10.34	< 0.05
Control	84.9	87.8	2.9		

3.2. Social skills

Significant improvements were also observed in the social skills of the intervention group. Assessed using the children's Social Skills Rating Scale (SSRS), notable enhancements were found in the intervention group's scores in cooperation and sharing, communication and expression, and emotional understanding and regulation. Specifically, the average score of the intervention group increased from 78.3 before the intervention to 96.8 after the intervention, a gain of 18.5 points. In contrast, the average score of the control group only rose from 77.6 to 79.4, an increase of 1.8 points. The difference between the two groups was statistically significant ($t =$

9.12, $P < 0.05$). See **Table 2**.

Table 2. Comparison of social skills scores between intervention and control groups

Group	Before intervention	After intervention	Improvement score	*t*-value	*P*-value
Intervention	78.3	96.8	18.5	9.12	< 0.05
Control	77.6	79.4	1.8		

3.3. Language ability

Significant progress was also evident in the language ability of the intervention group. Assessed using the Peabody Picture Vocabulary Test (PPVT), notable improvements were found in the intervention group's scores in vocabulary comprehension, expression, and application. Specifically, the average score of the intervention group increased from 80.2 before the intervention to 98.7 after the intervention, a gain of 18.5 points. In contrast, the average score of the control group only rose from 79.5 to 81.3, an increase of 1.8 points. The difference between the two groups was statistically significant ($t = 8.97$, $P < 0.05$). See **Table 3**.

Table 3. Comparison of language ability scores between intervention and control groups

Group	Before intervention	After intervention	Improvement score	*t*-value	*P*-value
Intervention	80.2	98.7	18.5	8.97	< 0.05
Control	79.5	81.3	1.8		

3.4. Attention concentration

Significant improvements were also observed in the attention concentration of the intervention group. Assessed using the attention section of the Attention Deficit Hyperactivity Disorder Rating Scale (ADHDRS), notable enhancements were found in the intervention group's scores in attention concentration, persistence, and distraction. Specifically, the average score of the intervention group decreased from 25.6 before the intervention to 18.1 after the intervention (a lower score indicates better attention concentration), a reduction of 7.5 points. In contrast, the average score of the control group only decreased from 25.9 to 25.3, a reduction of 0.6 points. The difference between the two groups was statistically significant ($t = 6.78$, $P < 0.05$). See **Table 4**.

Table 4. Comparison of attention concentration scores between intervention and control groups

Group	Before intervention	After intervention	Reduction score	*t*-value	*P*-value
Intervention	25.6	18.1	7.5	6.78	< 0.05
Control	25.9	25.3	0.6		

3.5. Quality of life

Significant progress was also evident in the quality of life of the intervention group. Assessed using the Pediatric Quality of Life Inventory (PedsQL), notable improvements were found in the intervention group's scores in physical health, emotional functioning, social functioning, and school performance. Specifically, the average score of the intervention group increased from 68.7 before the intervention to 82.3 after the intervention, a gain of 13.6 points. In contrast, the average score of the control group only rose from 67.9 to 69.4, an increase of 1.5 points. The difference between the two groups was statistically significant ($t = 7.23$, $P < 0.05$). See **Table 5**.

Table 5. Comparison of quality of life scores between intervention and control groups

Group	Before intervention	After intervention	Improvement score	*t*-value	*P*-value
Intervention	68.7	82.3	13.6	7.23	< 0.05
Control	67.9	69.4	1.5		

4. Discussion

This study aimed to investigate the impact of early comprehensive intervention on the neuropsychological development of children with autism and ADHD by conducting a one-year intervention on 130 cases. The results showed that the intervention group demonstrated significant improvements in cognitive function, social skills, language ability, attention, and quality of life, with statistically significant differences compared to the control group. The following is a detailed analysis and conclusion of the research findings:

In terms of cognitive function, the intervention group significantly improved their cognitive abilities, including verbal comprehension, perceptual reasoning, working memory, and processing speed, through early cognitive training and behavioral therapy [8]. This indicates that early intervention can specifically enhance the cognitive level of these children, laying a solid foundation for their future learning and life. The improvement in cognitive abilities not only helps the children better adapt to social environments but also enhances their self-management and problem-solving skills [9].

Regarding social skills, the intervention group significantly improved their cooperation, sharing, communication, expression, emotional understanding, and regulation through family guidance and social skills training. The enhancement of social skills is crucial for children with autism and ADHD, as it helps them establish better relationships with others, reduce conflicts and misunderstandings, and thereby improve their social adaptability and quality of life.

In language ability, the intervention group significantly improved their vocabulary comprehension, expression, and application skills through language training and cognitive stimulation. Language is an important tool for human communication, and the improvement in language ability helps the children better express their needs and emotions, effectively communicate with others, and thereby promote their social and emotional development.

In attention, the intervention group significantly improved their attention focus, sustainability, and distractibility through behavioral therapy and attention training. The improvement in attention is particularly important for children with ADHD, as it helps them better concentrate on tasks, reduce impulsive and distractible behaviors, and thereby enhance their learning and life efficiency.

Regarding quality of life, the intervention group significantly improved their physiological health, emotional function, social function, and school performance through comprehensive intervention measures. The improvement in quality of life is one of the important goals of rehabilitation for children with autism and ADHD, reflecting their comprehensive improvement and progress in multiple aspects.

In summary, the results of this study indicate that early comprehensive intervention has a significant promoting effect on the neuropsychological development of children with autism and ADHD. Through targeted behavioral therapy, cognitive training, and family guidance, the cognitive, social, language, and attention abilities of these children can be effectively improved, thereby enhancing their quality of life. This conclusion provides strong evidence for clinical practice, indicating that early intervention is one of the important means for the rehabilitation of children with autism and ADHD.

Additionally, this study found that the effects of early intervention varied among different children.

This may be related to factors such as the severity of the children's condition, family environment, and the implementation intensity of intervention measures. Therefore, in clinical practice, personalized intervention programs should be developed based on the specific conditions of each child, and changes during the intervention process should be closely monitored to adjust the intervention measures for achieving the best intervention effects.

Furthermore, this study emphasizes the important role of families in the rehabilitation process of these children. The family is one of the important environments for the children's life, and the participation and support of parents have a crucial impact on the children's rehabilitation. Therefore, in clinical practice, training and guidance for parents should be strengthened to enhance their understanding of autism and ADHD, encouraging them to actively participate in the rehabilitation process of their children and work together with doctors and therapists for the children's rehabilitation.

Finally, the results of this study also suggest that future research can further explore the specific effects and mechanisms of different intervention measures on the neuropsychological development of children with autism and ADHD. For example, comparisons can be made between different cognitive training methods, behavioral therapies, or family guidance programs regarding their effects on the rehabilitation of these children, in order to optimize intervention strategies and improve rehabilitation efficiency. At the same time, attention can also be given to the changes in the neuropsychological development of these children during long-term intervention, to assess the long-term effects and sustainability of intervention measures.

In conclusion, this study provides strong evidence for clinical practice by exploring the impact of early comprehensive intervention on the neuropsychological development of children with autism and ADHD. The results indicate that early intervention can significantly improve the children's cognitive, social, language, and attention abilities, thereby enhancing their quality of life.

Disclosure statement

The author declares no conflict of interest.

References

[1] Pan F, 2024, Early Intervention Helps Neuropsychological Development of Children with Autism and ADHD. Women and Children's Health Guide, 3(12): 12–14.

[2] Yu S, Xie X, 2023, Preliminary Screening and Intervention for Autism and Behavioral Problems in Preschool Children. Famous Doctor, 2023(24): 30–32.

[3] Zhang R, Dong C, Yi Y, et al., 2023, Clinical Study on the Treatment of Autism Spectrum Disorder Combined with Attention Deficit Hyperactivity Disorder Using Thumb-Tack Needle Therapy Combined with Repetitive Transcranial Magnetic Stimulation. Shandong Journal of Traditional Chinese Medicine, 42(7): 725–728.

[4] Du Y, 2022, Effectiveness of Osmotic Release Oral System Methylphenidate Alone and Combined with Sensory Integration Training in Children with High-Functioning Autism Spectrum Disorder Comorbid with Attention Deficit Hyperactivity Disorder. Chinese Journal of Modern Drug Application, 16(17): 180–183.

[5] Jiang X, 2021, Research on Eye Movement Characteristics and Diagnostic Value of Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder, thesis, Xiamen University.

[6] Xu X, Cai X, Meng F, et al., 2024, Changes in Plasma Valine Levels in Children with Autism and Their Relationship with Developmental Quotient. Journal of Peking University (Health Sciences), preprint: 1–15.

[7] Zhang Z, Dong X, Xu C, et al., 2024, Bibliometric Analysis of Research on the Application of Electroencephalography

in the Field of Autism Spectrum Disorder in the Past 10 Years. Chinese Journal of Rehabilitation Theory and Practice, 30(6): 693–700.

[8] Jing J, 2024, The Viewpoint of "Neurodiversity" in Autism Spectrum Disorder and Its Evaluation. Chinese Journal of Child Health Care, preprint: 1–5.

[9] Chen S, 2024, Intervention Study on Improving Facial Expression Recognition Ability of Children with Autism Using Dynamic Teaching Materials, thesis, Chengdu University.