Journal Website

Article history:
Received 05 November 2023
Revised 18 December 2023
Accepted 09 February 2024
Published online 15 March 2024

Iranian Journal of Neurodevelopmental Disorders

Volume 3, Issue 1, pp 66-71

Journal of Neurodevelopmental Disorder

E-ISSN: 2980-9681

Effectiveness of a Cognitive Rehabilitation-Based Intervention on Cognitive Flexibility and Stereotyped Behaviors in Children with Autism Spectrum Disorder

Shahla Ramezani[1*]

MA, Department of Psychology and Electronic Education for Exceptional Children, Islamic Azad University, Electronic Branch, Tehran, Iran (Corresponding Author).

*** Corresponding author email address**: shahlaramezani3440@gmail.com

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Ramezani, Sh. (2024). Effectiveness of a Cognitive Rehabilitation-Based Intervention on Cognitive Flexibility and Stereotyped Behaviors in Children with Autism Spectrum Disorder. *Iranian Journal of Neurodevelopmental Disorders*, *3*(1), 66-71.
https://doi.org/10.61838/kman.jndd.3.1.12

A B S T R A C T

Purpose: The present study aimed to examine the effectiveness of a cognitive rehabilitation-based intervention on cognitive flexibility and stereotyped behaviors in children with autism spectrum disorder.

Methods and Materials: This study employed a quasi-experimental design with a pretest–posttest control group framework. The statistical population included all children aged 9 to 12 years with autism attending rehabilitation centers in Tehran in 2024. From this population, 30 participants were selected through convenience sampling and were randomly assigned to experimental and control groups. The research instruments included the Cambridge Neuropsychological Test Automated Battery (CANTAB) and the Gilliam Autism Rating Scale (GARS). The experimental group received cognitive rehabilitation intervention over eight sessions, while the control group received no intervention during the study period. Data were analyzed using analysis of variance (ANOVA) and the Kolmogorov-Smirnov test.

Findings: The findings indicated that the cognitive rehabilitation intervention significantly increased cognitive flexibility ($p < 0.01$) and decreased stereotyped behaviors ($p < 0.05$) in the experimental group compared to the control group.

Conclusion: These results support the effectiveness of cognitive rehabilitation in enhancing cognitive and behavioral functioning in children with autism spectrum disorder and suggest its potential use as a complementary method in therapeutic programs for these children.

Keywords: *Autism, Stereotyped Behaviors, Cognitive Flexibility, Cognitive Rehabilitation-Based Intervention*

1. Introduction

Autism or Autism Spectrum Disorder (ASD) is one of the most prevalent neurodevelopmental disorders, characterized by atypical behavioral patterns, social difficulties, and deficits in communication skills (Karna & Stefaniuk, 2024; Ramezani & Zangeneh Motlagh, 2023; Rashmani & Mojtabaie, 2023). This disorder typically manifests during early childhood (Hillman, 2021) and can significantly impact a child's developmental, social, and cognitive abilities (Amiri, 2024). According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), the diagnostic criteria for autism include deficits in social communication and restricted, repetitive behaviors. These are marked by a wide range of impairments in social interaction and limited interests that emerge early in development (Miller et al., 2015).

The global prevalence of autism continues to rise, deeply affecting families and primary caregivers. According to estimates from some reputable sources on autism, the global prevalence is approximately 1 in 68 individuals. Epidemiological studies of ASD in Iran have reported a range from 1 in 150 to about 0.1% of school-aged children and adolescents diagnosed with autism (Jafari & Yousefi, 2023; Jafari et al., 2022).

Children with ASD exhibit significant difficulties in executive, cognitive, and behavioral functioning. These challenges include impairments in planning, emotional regulation, and control over complex behaviors (Olivares, 2021), which are attributed to deficits in various brain regions, especially the prefrontal and medial temporal areas (Bazrafshan & Sadeghi, 2021). One such area of difficulty leading to numerous challenges in children with ASD is cognitive flexibility. Cognitive flexibility refers to the ability to shift between thoughts or responses when encountering environmental changes (Wolff et al., 2018). As a component of executive functioning, it plays a crucial role in adapting to new conditions, learning, and academic performance because it enables individuals to modify their behavior and thoughts effectively in response to new situations (Yousefi Kalehkaneh et al., 2017). In this regard, the study by Miller et al. (2015) indicates that children with autism struggle with tasks requiring the shifting of cognitive sets. This deficit is a contributing factor to repetitive and stereotyped behaviors. Similarly, the study by De Vries et al. (2015) demonstrated that cognitive flexibility deficits in children with ASD lead to increased stereotyped behaviors. De Vries et al. (2015) further asserted that improving cognitive flexibility can reduce stereotyped behaviors in this group of children (De Vries et al., 2015).

Stereotyped behaviors are among the common issues in children with autism and are considered one of the core features of the disorder. These behaviors include repetitive movements such as hand-flapping, hand-twirling, biting hands, or repeatedly opening and closing doors and switching lights on and off; having restricted interests; and insistence on sameness (Ansari et al., 2019; Emad et al., 2023). This group of behaviors does not have any adaptive or stimulating function (Chester et al., 2019; Akbari Beyatiani, 2018). Stereotyped behaviors may result from neurocognitive disorders and deficits in social learning processes (Lord et al., 2018; Pickles et al., 2016), and are observed in over 80% of individuals with ASD. These behaviors are often considered indicators of sensory processing disturbances in children with ASD. On the other hand, stereotyped behaviors may serve as coping mechanisms in response to anxiety or environmental changes (Olivares, 2021; Zwaigenbaum & Penner, 2018).

These problems exacerbate social interaction difficulties in individuals on the autism spectrum and may lead to greater social isolation and communication challenges for children with autism and their families (Zhang et al., 2024). Consequently, various non-pharmacological therapeutic methods have been utilized to address stereotyped behaviors, such as sensory integration therapy, use of social robots (Emad et al., 2023), and music therapy (Hyun & C, 2016).

In the area of cognitive flexibility, studies have shown that training and practice through specific exercises—such as video games or simulation-based tasks (Bazrafshan & Sadeghi, 2021), occupational therapy strategies, and neurofeedback (Hadjkacem et al., 2016)—have been relatively effective.

In this context, cognitive rehabilitation is considered one of the effective methods for treating children with autism spectrum disorder. It focuses on enhancing executive functioning and strengthening cognitive abilities. This form of intervention includes various techniques aimed at improving brain function and altering brainwave patterns (Vosoughi Fard et al., 2013). Cognitive rehabilitation emphasizes the flexibility of neural networks and seeks to repair and enhance impaired capabilities through continuous training. Through these exercises, an individual's neural networks are reconstructed, and learning abilities across multiple domains are enhanced (Khaleghi et al., 2023).

Accordingly, previous studies have shown that this form of rehabilitation is effective for children with various disorders, including symptoms of attention-deficit/hyperactivity disorder (van Dongen-Boomsma et al., 2014), learning disorders (Wilkey et al., 2020), and hearing impairments. However, different studies have yielded inconsistent results. The study by Varanda and Fernandez (2017) indicated the effectiveness of cognitive rehabilitation on cognitive flexibility in children with autism (Varanda & Fernandes, 2017). Similarly, Jafari and Yousefi (2023) reported the effectiveness of this intervention on stereotyped behaviors in this group of children. However, Miller et al. (2015), in their randomized trial, reported that cognitive rehabilitation had no significant effect on the cognitive flexibility of children with autism (Jafari & Yousefi, 2023). Furthermore, a review of national and international research revealed no studies simultaneously targeting both cognitive flexibility and stereotyped behaviors. Therefore, given the existing contradictions and the lack of sufficient information in this area, there is a notable research and knowledge gap. As such, the present study aims to answer the following question: Does cognitive rehabilitation have a significant effect on

E-ISSN: 2980-9681

cognitive flexibility and stereotyped behaviors in children with autism spectrum disorder?

2. Methods and Materials

2.1. Study Design and Participants

This study employed a quasi-experimental design with a pretest–posttest control group format. The statistical population included all children aged 9 to 12 years diagnosed with Autism Spectrum Disorder (ASD) who were receiving education and rehabilitation services at special education and rehabilitation centers in Tehran in 2024. From this population, 30 children were selected through convenience sampling based on specific inclusion and exclusion criteria and were randomly assigned to two groups: experimental (15 participants) and control (15 participants).

The inclusion criteria consisted of a confirmed diagnosis of autism, age between 9 and 12 years, parental willingness for the child's participation in the intervention sessions, absence of severe intellectual disability, and no major sensory impairments such as blindness or deafness. These criteria were verified through observation, interviews, and review of medical records. The exclusion criteria included withdrawal of parental consent for continued participation, absence from more than two sessions, initiation of pharmacological treatment during the intervention process, or severe reluctance or resistance by the child to attend cognitive rehabilitation sessions. It is worth noting that all ethical considerations were observed in this study. Specifically, participation in the sessions was conditional upon obtaining written informed consent from the parents. At any time, parents were free to withdraw their child from the sessions. Participation was also provided free of charge to families.

2.2. Measures

2.2.1. Autism

The Gilliam Autism Rating Scale (GARS) is a standardized checklist used for diagnosing individuals with Autism Spectrum Disorder and comprises five distinct subscales. The GARS was first normed in 1994 on a sample of 1,094 individuals from 46 U.S. states, the District of Columbia, Puerto Rico, and Canada. It was developed based on the definitions provided by the Autism Society of America and aligned with the Diagnostic and Statistical Manual of Mental Disorders. This tool is suitable for assessing individuals aged 3 to 22 years and can be completed by parents or professionals in either home or school settings. The test consists of four subscales, each containing 14 items. In this study, the primary focus was on the subscale related to stereotyped behaviors, which includes 14 items assessing various repetitive and unusual behaviors in children. The validity of the GARS has been confirmed through numerous studies. Findings suggest that: (a) the GARS effectively identifies core features of ASD; (b) test scores show high inter-correlations and correlate significantly with performance on other autism screening tools; (c) the GARS can distinguish individuals with ASD from those with other severe behavioral disorders; and (d) test scores are not correlated with age, though individuals with different personality types yield different scores on the GARS (Aghili et al., 2022). In the study by Akbari Beyatiani (2018), the reliability of various components of the GARS—stereotyped behavior, communication, social interactions, developmental disorders, and total score—were reported using Cronbach's alpha coefficients as 0.90, 0.93, 0.88, and 0.96, respectively, indicating high reliability of the tool in assessing children with ASD.

2.2.2. Cognitive Flexibility and Stereotyped Behaviors

The CANTAB is an advanced tool for assessing various aspects of executive functioning, developed by the University of Cambridge in 1980 and continuously enhanced since then. This computerized battery is designed for simple, flexible, and user-friendly cognitive assessment, independent of time and location, and allows for the isolated evaluation of executive functions. In this study, the "Cognitive Flexibility" subtest was utilized. The CANTAB has been widely used in studies assessing cognitive functioning in individuals with ASD, and its validity is well established. The cognitive flexibility subtest, which is sensitive to the prefrontal cortex, evaluates an individual’s ability to shift cognitive strategies and respond to changing demands. For children aged 2 to 14 years, the internal reliability of this test ranges from 0.73 to 0.95. In the study by Khaleghi et al. (2023), the Cronbach’s alpha coefficient was reported as 0.88 for reaction time in the five-choice movement test and 0.79 for visual processing speed, indicating acceptable reliability (Khaleghi et al., 2023).

2.3. Interventions

2.3.1. Cognitive Rehabilitation-Based Intervention

This program was designed as an adaptive and integrated approach based on authoritative sources in the fields of cognitive rehabilitation, ASD treatment, and task-based training programs. Sources included studies by Ghasemi et al. (2019), Kaplan and Sadock (2015), and principles of cognitive-behavioral interventions for children with autism (Ghasemi et al., 2019; Kaplan & Sadock, 2015).

The cognitive rehabilitation-based intervention for children with Autism Spectrum Disorder was delivered over eight structured sessions, each designed to build cognitive flexibility and reduce stereotyped behaviors through playful, engaging, and developmentally appropriate activities. The first session aimed to create a sense of safety and introduce the concept of cognitive flexibility through light movement games, visual aids depicting change, and creative tasks like drawing alternative endings to everyday scenarios. The second session focused on understanding rule flexibility using games with shifting rules and card-sorting tasks that required switching categorization strategies. In the third

E-ISSN: 2980-9681

session, children were taught coping strategies for unexpected situations using visual schedule alterations, deep breathing with calming phrases, and therapeutic storytelling. The fourth session emphasized flexible and creative problem-solving through interactive stories, construction toys, and role-playing exercises. The fifth session strengthened attentional shifting through sound identification games, multi-step instructions, and color-coded command cards. In the sixth session, stereotyped behaviors were identified and replaced with constructive alternatives like using a "calm-down box," learning the "stop + choose" strategy, and engaging in structured physical activities. The seventh session focused on improving role-switching and interpersonal adaptability through turn-taking games, puppet scenarios illustrating social challenges, and emotion recognition cards to practice appropriate social responses. The final session reviewed previously learned skills through visual prompts, evaluated progress, and introduced a home-based practice booklet including alternative behaviors, attentional shifting exercises, and a flexible daily schedule to support skill generalization beyond the therapeutic setting.

2.4. Data Analysis

For data analysis, both descriptive and inferential statistical methods were employed. At the descriptive level, indicators such as frequency, percentage, mean, and standard deviation were used. At the inferential level, after confirming the normality of the data using the Kolmogorov-Smirnov test, analysis of variance (ANOVA) was conducted using SPSS version 24 to test the study hypotheses.

3. Findings and Results

The majority of participants in both the experimental and control groups were boys and belonged to the 11–12 age range. Table 1 presents the descriptive statistics of the study variables for both groups.

Table 1

Descriptive Findings of Study Variables

Variable	Phase	Experimental Group		Control Group	
		Mean	Standard Deviation	Mean	Standard Deviation
Cognitive Flexibility	Pretest	31.27	4.12	30.93	4.08
	Posttest	39.6	3.85	32.07	3.94
Stereotyped Behaviors	Pretest	24.53	3.76	25.00	3.94
	Posttest	19.4	3.15	24.17	4.02

As evident from Table 1, the experimental group scored higher in cognitive flexibility and showed a reduction in stereotyped behaviors in the posttest compared to the control group. To examine the statistical significance of these differences, an analysis of variance (ANOVA) test was conducted. However, before proceeding with ANOVA, the Kolmogorov–Smirnov test was used to verify the normality of data distribution.

Given that the Kolmogorov–Smirnov test statistics for the variables in both stages were greater than 0.05, the assumption of normal data distribution was confirmed, making it appropriate to use parametric tests.

Table 2

ANOVA Results for Hypothesis Testing

Variable	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance Level	Effect Size
Cognitive Flexibility	36.269	1	26.269	25.03	0.000	0.174
Stereotyped Behaviors	1.825	1	1.825	20.305	0.002	0.242

As shown in Table 2, the significance level for stereotyped behaviors is less than 0.05, and for cognitive flexibility, it is less than 0.01. Accordingly, the study hypothesis was confirmed. Therefore, it can be concluded that the effectiveness of the cognitive rehabilitation-based intervention in increasing cognitive flexibility and reducing stereotyped behaviors in children with Autism Spectrum Disorder is statistically significant.

4. Discussion and Conclusion

The present study aimed to investigate the effectiveness of a cognitive rehabilitation-based intervention on cognitive flexibility and stereotyped behaviors in children with Autism Spectrum Disorder. The findings of this research indicated that the cognitive rehabilitation intervention led to a significant improvement in cognitive flexibility in children with ASD. This result was confirmed at the 0.01 significance level, indicating a high degree of effectiveness. The findings are consistent with previous studies (Jafari & Yousefi, 2023; Jafari et al., 2022; Kenworthy et al., 2014; Mahdavi et al., 2019; Varanda & Fernandes, 2017).

In explaining this finding, it can be stated that cognitive rehabilitation, through structured exercises in areas such as working memory, response inhibition, and mental flexibility, aims

E-ISSN: 2980-9681

to enhance the functioning of neural networks related to executive functioning. These exercises are typically delivered gradually, repetitively, and with feedback and reinforcement, resulting in more effective neural connectivity in the prefrontal cortex—the brain region responsible for controlling executive behaviors and cognitive flexibility (Stuss & Levine, 2002). Kenworthy et al. (2014) also argued that targeted cognitive exercises can help children with autism switch between different mental strategies and demonstrate greater flexibility when encountering novel situations (Kenworthy et al., 2014). These trainings not only improve cognitive functioning but also reduce anxiety caused by environmental changes.

Furthermore, the findings revealed that cognitive rehabilitation had a statistically significant effect on reducing stereotyped behaviors in children with ASD, with this result reaching the 0.05 significance level. This finding is consistent with prior studies (Boyd et al., 2011; Fathi et al., 2018; Rahman et al., 2017; Wong et al., 2015).

In explaining these findings, it can be said that stereotyped or repetitive behaviors often arise in response to deficits in cognitive processing, mental inflexibility, and difficulties in emotional regulation. Considering the role of executive functioning in behavioral regulation, impairments in this domain may contribute to the increase in stereotyped behaviors. The cognitive rehabilitation intervention, by training skills such as response inhibition, cognitive flexibility, selective attention, and working memory, supports the development of cognitive self-regulation and thereby facilitates the reduction of stereotyped behaviors (Wong et al., 2015). Such interventions help the child focus on novel stimuli and exhibit more flexible and adaptive responses to the environment, gradually reducing their reliance on repetitive behaviors.

In sum, the findings of this study, along with existing evidence in the research literature, underscore that cognitive rehabilitation is not only effective in enhancing cognitive skills but can also indirectly contribute to reducing certain challenging behavioral characteristics such as stereotyped behaviors. Therefore, given the cognitive and behavioral challenges faced by children with ASD, the use of targeted cognitive interventions can play a vital role in improving their individual and social quality of life. Overall, this study provides evidence in support of the efficacy of cognitive rehabilitation, which may be of particular interest to professionals in psychology, rehabilitation, and special education.

It is worth noting that despite its important findings, this study—like all research—has certain limitations that should be considered when generalizing the results. These include the lack of long-term follow-up to examine the persistence of intervention effects, reliance on parental reports and behavioral observations as assessment tools that may be prone to bias, and limited control over intervening variables such as type of school education or family psychological status, which may have influenced the outcomes. Therefore, it is recommended that future research utilize neuroscience-based tools and include multi-month follow-ups to examine the long-term effects of the intervention.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

References

Aghili, S. M., Asghari, M., & Namazi, H. (2022). The effectiveness of music therapy on aggression and stereotyped behaviors in children with autism spectrum disorder. *Exceptional Children Quarterly*, *22*(1), 143-154. https://joec.ir/browse.php?a_id=1561&sid=1&slc_lang=en

Ansari, M., Hojjati, S., Elmieh, N., & Beidabadi, R. (2019). A study of stereotyped and repetitive behaviors in children with autism spectrum disorder. *Journal of Neurological Disorders*, *14*(3), 123-131.

Bazrafshan, A., & Sadeghi, L. (2021). Cognitive and psychological consequences of autism spectrum disorder in children. *Sadra Medical Sciences Journal*, *9*(2), 120-131.

Boyd, B. A., McDonough, S. G., & Bodfish, J. W. (2011). Evidence-based behavioral interventions for repetitive behaviors in autism. *Journal of Autism and Developmental Disorders*, *42*(6), 1236-1248. https://doi.org/10.1007/s10803-011-1284-z

De Vries, M., Prins, P. J. M., Schmand, B. A., & Geurts, H. M. (2015). Working memory and cognitive flexibility-training for children with an autism spectrum disorder: a randomized controlled trial. *Journal of Child Psychology and Psychiatry*, *56*(5), 566-576. https://doi.org/10.1111/jcpp.12324

Emad, V., Bagherzadeh, M., Mohammadi, A., & Aghayari, H. (2023). Comparing the effectiveness of sensory integration exercises with and without robots on stereotyped behaviors in boys with autism spectrum

E-ISSN: 2980-9681

disorder. *SID Scientific Journal*, *12*(1), 151-160. https://doi.org/10.32598/SJRM.12.1.14

Fathi, F., Naderi, H., & Hosseini, R. (2018). The effect of cognitive rehabilitation on reducing stereotyped behaviors in children with autism spectrum disorder. *Iranian Journal of Psychological Rehabilitation*, *7*(2), 25-38.

Ghasemi, M., Zarei, M., & Rahimi, C. (2019). The effect of task-based cognitive rehabilitation program on executive functioning in children with epilepsy. *Iranian Journal of Clinical Psychiatry and Psychology*, *25*(3), 243-256.

Hadjkacem, L., Ayadi, H., Turki, M., & Yaich, S. (2016). Effects of Neurofeedback on Cognitive and Behavioral Issues in ASD. *[Unavailable]*.

Hillman, H. (2021). Child-centered play therapy as an intervention for children with autism: A literature review. https://psycnet.apa.org/record/2018-44224-002

Hyun, J., & C, S. K. (2016). Education-oriented Music Therapy as an After-school Program for Students with Emotional and Behavioral Problems. *Arts in Psychotherapy*, *37*(3), 190-196. https://doi.org/10.1016/j.aip.2010.03.004

Jafari, R., & Yousefi, R. (2023). The effectiveness of social cognition training based on theory of mind on stereotyped behaviors, social interaction, and empathy in children with autism spectrum disorder. *Tabriz University Psychology Journal*, *18*(1), 129-146. https://psychologyj.tabrizu.ac.ir/article_16944_30ea8f2366e42cca4192d031c63379c2.pdf

Jafari, S., Parizad, N., Radfar, M., & Khalkhali, H. (2022). The effect of culturally adapted play therapy with parental involvement on stereotyped behaviors in children with autism. *Nursing and Midwifery Journal of Urmia University of Medical Sciences*, *20*(2), 125-136. https://doi.org/10.52547/unmf.20.2.125

Kaplan, H., & Sadock, B. (2015). *Kaplan and Sadock's Synopsis of Psychiatry*. Elmi Publishing.

Karna, W., & Stefaniuk, I. (2024). The Influence of Peer Relationships on the Social Development of Children with Autism Spectrum Disorder. *Iranian Journal of Neurodevelopmental Disorders*, *2*(4), 10-18. https://doi.org/10.61838/kman.jndd.2.4.2

Kenworthy, L., Anthony, L. G., Naiman, D. Q., Cannon, L., Wills, M. C., Luong-Tran, C., Werner, M. A., Alexander, K. C., Strang, J., Bal, E., Sokoloff, J. L., & Wallace, G. L. (2014). Randomized controlled effectiveness trial of executive function intervention for children on the autism spectrum. *Journal of Child Psychology and Psychiatry*, *55*(4), 374-383. https://doi.org/10.1111/jcpp.12161

Khaleghi, A., Naderi, F., Johari-Fard, R., & Javadzadeh, M. (2023). Comparison of the effectiveness of task-based cognitive rehabilitation and computer-based cognitive rehabilitation programs on cognitive flexibility in children with epilepsy. *Shafa Khatam Journal*, *11*(3). https://doi.org/10.61186/shefa.11.3.25

Lord, C., Elsabbagh, M., Baird, G., & Veenstra-Vanderweele, J. (2018). Autism spectrum disorder. *The lancet*, *392*(10146), 508-520. https://doi.org/10.1016/S0140-6736(18)31129-2

Mahdavi, M., Ahmadi, H., & Ramazani, N. (2019). The effectiveness of cognitive rehabilitation on executive functioning and cognitive flexibility in children with autism spectrum disorder. *Journal of Psychology and Educational Sciences, University of Tehran*, *49*(3), 275-292.

Miller, H. L., Ragozzino, M. E., Cook, E. H., Sweeney, J. A., & Mosconi, M. W. (2015). Cognitive Set Shifting Deficits and Their Relationship to Repetitive Behaviors in Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, *45*(3), 805-815. https://doi.org/10.1007/s10803-014-2244-1

Olivares, P. J. (2021). Response inhibition, cognitive flexibility and working memory in obsessive-compulsive disorder, generalized anxiety disorder and social anxiety disorder. *International journal of environmental research and public health*, *18*(7), 3642. https://doi.org/10.3390/ijerph18073642

Pickles, A., Le Couteur, A., Leadbitter, K., Salomone, E., Cole-Fletcher, R., & Tobin, H. (2016). Parent-mediated social communication therapy for young children with autism (PACT): long-term follow-up of a randomized controlled trial. *The lancet*, *388*(10059), 2501-2509. https://doi.org/10.1016/S0140-6736(16)31229-6

Rahman, A., Paul, R., & Sulaiman, N. (2017). Effects of cognitive behavioral intervention on repetitive behaviors among children with autism. *Malaysian Journal of Health Sciences*, *15*(2), 10-18.

Ramezani, Z., & Zangeneh Motlagh, F. (2023). Prediction of life satisfaction based on resilience, coping styles and acceptance of sick children in parents with children with autism. *Iranian Journal of Neurodevelopmental Disorders*, *2*(3), 1-10. https://maherpub.com/jndd/article/view/31

Rashmani, B., & Mojtabaie, M. (2023). The effectiveness of body language training using ABM method on the communication skills of autistic children. *Iranian Journal of Neurodevelopmental Disorders*, *2*(3), 50-57. https://maherpub.com/jndd/article/view/36

Stuss, D. T., & Levine, B. (2002). Adult clinical neuropsychology: Lessons from studies of the frontal lobes. *Annual review of psychology*, *53*(1), 401-433. https://doi.org/10.1146/annurev.psych.53.100901.135220

van Dongen-Boomsma, M., Vollebregt, M. A., Buitelaar, J. K., & Slaats Willemse, D. (2014). Working memory training in young children with ADHD: A randomized placebo-controlled trial. *Journal of Child Psychology and Psychiatry*, *55*(8), 886-896. https://doi.org/10.1111/jcpp.12218

Varanda, C. A., & Fernandes, F. D. M. (2017). Cognitive flexibility training intervention among children with autism: a longitudinal study. *Psicologia: Reflexão e Crítica*, *30*, 15. https://doi.org/10.1186/s41155-017-0069-5

Vosoughi Fard, F., Alizadeh Zarei, M., Kamali, M., & Nazari, M. A. (2013). The effect of neurofeedback and neurofeedback combined with occupational therapy based on cognitive rehabilitation on executive functioning in autistic children. *Scientific-Research Journal of Modern Rehabilitation*, *7*(2), 29-42. https://journals.tums.ac.ir/mrj/article-1-5008-en.html

Wilkey, E. D., Pollack, C., & Price, G. R. (2020). Dyscalculia and typical math achievement are associated with individual differences in number-specific executive function. *Child development*, *91*(2), 596-619. https://doi.org/10.1111/cdev.13194

Wolff, N., Giller, F., Buse, J., Roessner, V., & Beste, C. (2018). When repetitive mental sets increase cognitive flexibility in adolescent obsessive-compulsive disorder. *Journal of Child Psychology and Psychiatry*, *59*(9), 1024-1032. https://doi.org/10.1111/jcpp.12901

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *45*(7), 1951-1966. https://doi.org/10.1007/s10803-014-2351-z

Yousefi Kalehkaneh, Z., Zangouleh-Chi, Z., & Keshavarz, N. (2017). Cognitive flexibility and autism spectrum symptoms. *Proceedings of the 6th Congress of the Iranian Psychological Association*, *12*(Special Issue), 1944-1947. https://www.sid.ir/paper/896838/fa

Zhang, X., Lv, C. C., Tian, J., Miao, R. J., Xi, W., & Hertz, Q. (2024). Long-Term Psychological Effects of Autism Spectrum Disorder. *[Unavailable]*.

Zwaigenbaum, L., & Penner, M. (2018). Autism spectrum disorder: advances in diagnosis and evaluation. *bmj*, *361*, k1674. https://doi.org/10.1136/bmj.k1674

E-ISSN: 2980-9681