

The Effectiveness of a Training Program Based on Cognitive Enhancement Therapy in Developing Cognitive Performance Among Children With Autism Spectrum Disorder in Jordan

Banan Mubaytheen^{[a],*}: Ibrahim El-Zraigat^[b]

^[a] Independent author. Amman, Jordan.

^[b] Ph.D, Professor. The University of Jordan.

*Corresponding author.

Received 13 March 2024; accepted 10 April 2024

Published online 26 April 2024

Abstract

The main purpose of the present study was to investigate the effectiveness of a training program based on cognitive enhancement therapy in developing cognitive performance among children with Autism Spectrum Disorder (ASD) in Jordan. The sample of the study consisted of 20 participants, were divided equally into two groups: one of them experimental group and the other was control group. A scale cognitive performance was developed and used. The reliability and validity of the scale was established. The researchers used Mann-Whitney U to answer the study questions. The results showed the effectiveness of cognitive enhancement therapy in developing cognitive performance among children with Autism Spectrum Disorder (ASD). The study recommended adapting the therapy used as well as expanding the age of ASD cases.

Key words: Autism Spectrum Disorder (ASD); Cognitive enhancement therapy; Cognitive performance; Jordan

Mubaytheen, B., & El-Zraigat, T. (2024). The Effectiveness of a Training Program Based on Cognitive Enhancement Therapy in Developing Cognitive Performance Among Children With Autism Spectrum Disorder in Jordan. *Canadian Social Science*, 20(2), 98-102. Available from: <http://www.cscanada.net/index.php/css/article/view/13377>
DOI: <http://dx.doi.org/10.3968/13377>

1. AN INTRODUCTION

In recent years, autism spectrum disorder has attracted the attention of researchers, therapists, and those providing services. This interest may be due to the clear increase

in the prevalence of this disorder and the nature of the characteristics that distinguish it. The characteristics of a child with autism spectrum disorder negatively affect the process of communication and social interaction, as well as engagement in purposeful behaviors. A child with autism spectrum disorder shows a persistent and noticeable inability to use language, establish social relationships, exchange emotions, and respond appropriately to social situations. He also practices various forms of undesirable stereotyped, repetitive, and ritualistic behaviors, which often raise families' concerns and pose a challenge for them and for those who provide care (Mubaytheen & El-Zraigat, 2019).

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, issued by the American Psychiatric Association, defines autism spectrum disorder as a neurodevelopmental disorder that results in persistent deficits in communication and social interaction, and repetitive and restricted behaviors. These symptoms appear during early childhood (American Psychiatric Association, APA, 2022).

Currently, there are many theories aimed at explaining and understanding autism spectrum disorder. With the multiplicity of viewpoints, there have been many therapeutic programs aimed at reducing symptoms, improving the level of performance, and encouraging growth (El-Zraigat, 2020). For example, behavioral treatments focus on the uses of behavioral theory to increase the acquisition or maintenance of acquired behaviors, while alternative treatments such as medical, occupational or natural therapy focus on medical and therapeutic uses in treating manifestations of undesirable behavior in person with autism spectrum disorder. While we find that cognitive therapies generally target training and activities that improve cognitive skills that help increase social awareness and awareness used in various forms of social interactions and situations (William & Wright, 2004; Mubaytheen & El-Zraigat, 2019).

Regarding the cognitive characteristics of children with autism spectrum disorder, these children show a deficit in cognitive processes. This perhaps explains their unusual responses to sensory stimulation, and the reason for this is due to the level of cognitive functional performance of this category of persons. Children with autism spectrum disorder suffer from clear deficiencies in their cognitive executive functioning. Therefore, these children face noticeable difficulties in processing information, which affects understanding and cognitive development (El-Zraigat, 2016). Thus, training and activities aimed at developing aspects of cognitive development become of high importance for this group of children. Perhaps among these exercises and treatments is cognitive enhancement therapy which based on developing performance in the social, cognitive and neurological aspects. This type of therapy attempts to increase the ability to process active cognitive information and confront social challenges (Eack, 2011).

Cognitive enhancement therapy is a form of cognitive rehabilitation. This type of therapy uses group exercises and activities aimed at improving various areas of social cognitive functions, adaptive behavior, and social adaptation. This kind of therapy targets the areas of memory, problem solving and perception, developing thinking, and promoting positive peer interaction (Eack, Greenwald, Hogarty, Bahorik, Litschge, Mazefsky, & Minshew, 2013). Cognitive enhancement therapy encourages awareness of the response and its effects and improves the performance of general cognitive tasks, which helps encourage social cognitive development. Therefore, this therapy requires structured learning experiences, training, and support. Hence, the success of this therapy requires providing a joint supportive interactive social environmental context, and organized learning experiences (Hogarty & Flesher, 1999).

Eack, Greenwald, Hogarty, Bahorik, Litschge, Mazefsky, & Minshew, (2013) have indicated the effectiveness of enhancing cognitive therapy for adults with autism spectrum disorder in processing social and non-social information. Also, Crooke, Winner, & Olswang, (2016). confirmed the role of social cognitive processing in the development of social knowledge, and thus social behaviors. On the other hand, Pasqualotto, Mazzoni, Bentenuto, Mulè, Benso and Venuti (2021) study showed that most of the cognitive interventions identified were effective in developing executive functioning and reducing symptoms in children and youth with autism spectrum disorder.

2. STUDY PROBLEM AND QUESTIONS

A child with autism spectrum disorder appears to be often associated with different types of cognitive challenges, which are significantly manifested by problems in

executive functioning, such as the social, emotional, cognitive, and communication aspects (Pasqualotto, Mazzoni, Bentenuto, Mulè, Benso & Venuti, 2021). Cognitive development is affected by the type of experiences to which it is exposed and by interaction with the surrounding environment. Through interaction, the child acquires various skills that enable him/ her to form awareness and social perception, develop problem-solving processes, and other cognitive processes. This type of experience requires communication and interaction with the surrounding environment, and given the child with autism spectrum disorder marked inability to communicate and social interaction, in addition to his preoccupation with undesirable stereotypical, repetitive, and ritualistic behaviors, these characteristics negatively affect the type of experience that the child acquires. Therefore, the cognitive development of a child with autism spectrum disorder is negatively affected by his characteristics (Mubaytheen & El-Zraigat, 2019).

Hence, the current study sought to develop a program based on cognitive enhancement and examine its effect in improving the level of cognitive performance among a sample of children with autism spectrum disorder in Jordan. Specifically, this study attempted to answer the main following question:

- Are there statistically significant differences at the significance level ($\alpha = 0.05$) in the development of cognitive performance between the control group and the experimental group?

3. PURPOSE OF THE STUDY

The current study aimed to determine the effectiveness of treatment based on cognitive enhancement in developing cognitive performance among a sample of children with autism spectrum disorder in Jordan.

4. STUDY LIMITATIONS

The results of this study were determined by the characteristics of its sample, age group 15 years and above with autism spectrum disorder. the information collection tools, the data collection procedures, and the research methodology used.

5. METHODOLOGY

5.1 Participants

The study sample consisted of (20) cases diagnosed with autism spectrum disorder in the age group of 15 years and above, and all cases were from the East Atlas Autism Center, as this is the only center that provides care for the age groups of 15 years and above with those with autism spectrum disorder.

5.2 Cognitive performance scale

Persons with autism spectrum disorder are characterized by special cognitive characteristics. Hence, the researchers designed a scale to measure the cognitive performance of children with autism spectrum disorder by referring to literature related to the subject of cognitive performance, such as: Yourell (2011), Gordon, Pierce, Bartlett, & Tanaka, (2014), Didehbani, Allen, Kandalf, Krawczyk, & Chapman, (2016), and Mubaytheen & El-Zraigat, (2019). The cognitive performance behavior of the study participants was judged according to a four-rating scale, as follows: often, sometimes, rarely, and never. The construct validity indicators were verified through the correlation coefficients of the items with the overall dimension of the scale, and they ranged between .330 and .963, which are acceptable correlation coefficients for the purposes of the study.

5.2.1 Reliability of the scale

To verify the reliability of the scale, the reliability coefficient of the estimators was used on a sample of (10) children with autism spectrum disorder from outside the study sample, and the reliability coefficient of the estimators for the cognitive performance scale was 0.97.

5.2.2 Validity of the scale

The construct validity indicators were verified through the correlation coefficients of the items with the overall dimension of the scale, and they ranged between .330 and .963, which are acceptable correlation coefficients for the purposes of the study.

5.3 Cognitive enhancement therapy program

The goal of cognitive enhancement therapy is to provide persons with autism spectrum disorder with the skills necessary to improve cognitive performance. This treatment encourages the ability to actively process cognitive information and confront social challenges. Cognitive enhance enhancement therapy requires assessment of the social context and social cognition, the use of homework, practice, feedback and educational topics, training to improve memory, problem-solving training, and increased social engagement (Eack, Hogarty, Greenwald, Litschge, Porton, Mazefsky, & Minshe, 2018). The program was built by referring to the related literature such as: Loehr, & Meyers, (2009), Loehr, & Meyers, (2014), Vick, Beth, (2014), Rump, Giovannelli,

Minshe, & Strauss, (2009), Yourell, (2011), Gordon, Pierce, Bartlett, & Tanaka, (2014), Didehbani. Allen, Kandalaft, Krawczyk, & Chapman, (2016), and Eack, Hogarty, Greenwald, Litschge, Porton, Mazefsky, & Minshe (2018).

5.3.1 Program validity

The researchers used content validity by presenting the proposed program, which was built on 10 specialists in the field of autism spectrum disorder, special education, psychological and educational assessment, and psychology. This was in order to obtain their opinions on the suitability of the proposed behavioral activities and practices and their connection to the proposed therapeutic areas, as well as the adequacy of the activities and behaviors aimed at treating the targeted behavior. After that, the suggestions of the specialists were taken into account, and then program was prepared in its final form and implemented.

5.4 Study design and statistical processing

To answer the main study question, a quasi-experimental design was used. The two-group design was applied (the experimental group and the control group). The study participants were distributed into two groups, each of which included 10 children with autism spectrum disorder. The study participants in both groups underwent a pre-test and a post-test on the cognitive performance scale. Participants in the experimental group were those who received training on the program that was built. The data were analyzed by using means, standard deviations, and the Mann-Whitney U test.

6. RESULTS

This section presents the results of the study.

6.1 Equivalence of groups according to the pre-test measurement

To verify the equality of the groups, the means, the average ranks, and the total rank were extracted, and the Mann-Whitney U test was used to compare the means ranks of the cognitive performance scale among a sample of children with autism spectrum disorder in Jordan between the experimental and control groups. The following table shows these results:

Table 1
Results of the Mann-Whitney U test to find the significance of the differences between the means ranks of the cognitive performance scale among a sample of children with autism spectrum disorder in Jordan between the experimental and control groups according to the pre-measurement

Scale	Group	N.	Means ranks	Sum of ranks	U Value	Z Value	Sig.
Cognitive performance	Experimental	10	9.50	95.00	40.00	-.757	.449
	Control	10	11.50	115.00			

Table 1 shows that there are no statistically significant differences for the cognitive performance scale among

a sample of children with autism spectrum disorder in Jordan between the experimental and control groups on

the pre-measurement, and this indicates the equality of the groups.

- Are there statistically significant differences at the significance level ($\alpha = 0.05$) in the development of cognitive performance between the control group and the experimental group?

To answer this question, the means and standard deviations of the post-measurement of the cognitive performance scale were extracted between the control group and the experimental group. The following table shows these averages:

Table 2
Means and standard deviations between members of the experimental and control group on the cognitive performance scale between the control group and the experimental group according to the treatment program

Experimental group		Control group	
Means	S.D.	Means	S.D.
85.20	7.76	60.30	12.93

Table 3
Results of the Mann-Whitney U test to find the significance of the differences between the means ranks of the cognitive performance scale between the control group and the experimental group according to the treatment program on the post-measurement

Scale	Group	N.	Means ranks	Sum of ranks	U Value	Z Value	Sig.
Cognitive performance	Experimental	10	15.45	154.50	.500	-3.74	.000*
	Control	10	5.55	55.50			

Table 2 shows that there are apparent differences in the means and standard deviations on the cognitive performance scale between the control group and the experimental group depending on the treatment program, which can be observed from the table. This indicates the presence of differences after implementing the training program. To examine these differences, the average ranks and the total rank were extracted and the Mann-Whitney U test was used, which is a non-parametric test to compare between two different groups and to compare the average ranks. Table 3 shows this test.

Table 3 shows that the value of ($U = 0.500$ and the value of $Z = -3.74$) are statistically significant values at the significance level of 0.05, meaning that there are statistically significant differences on the cognitive performance scale between the control group and the experimental group depending on the therapeutic program on the post-measurement. The table shows that the mean scores for the post-measurement between the experimental and control groups were higher for the experimental group than the control group, and this indicates the effectiveness of the therapeutic program in improving the cognitive performance of children with autism spectrum disorder.

7. DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The results indicated the effectiveness of the program based on cognitive enhancement therapy in developing the cognitive performance of participants in the experimental group compared to the performance level of participants in the control group. The improvement in the performance of the experimental group members is due to the activities and exercises included in the training sessions, which helped provide the students with cognitive

skills appropriate to the nature of their cases, and these skills were reflected positively in the organized use of them in dealing with daily practice activities. Cognitive enhancement therapy has helped participating cases acquire the skills necessary to drive social cognitive and neurocognitive functioning. The improvement in social cognition among people with autism spectrum disorder also contributes significantly to adaptation. Participants were able to benefit from the program's activities because they may have normal mental abilities.

The activities of the applied program based on cognitive enhancement therapy have provided a form of cognitive rehabilitation, which studies have indicated to be effective in treating information processing weakness in individuals with autism spectrum disorder. This type of therapy uses group exercises and activities aimed at improving various areas of social cognitive functions, adaptive behavior, and social adjustment through repeated practice and organized training.

Cognitive enhancement therapy activities targeted the areas of memory, problem solving, perception, developing thinking, and promoting positive interaction between peers. The treatment process was organized through special exercises and activities carried out in a small group, aimed at facilitating the development of cognitive skills.

This result leads us to conclude that the organizer's use of activities aimed at developing cognitive skills, with specific steps and using competent skill therapists, leads to success in developing cognitive performance in cases of autism spectrum disorder. Just as the use of learned skills leads to the formation of successful and positive experiences, and that these new acquired experiences help in developing cognitive development milestones.

Studies have confirmed the role of cognitive training in developing and acquiring the necessary skills such as

the study of Eack, Hogarty, Greenwald, Litschge, Porton, Mazefsky, & Minshew, (2018), Pamela, Michella, Gracia, and Lesley (2016), and Pasqualotto, Mazzoni, Bentenuto, Mulè, Benso and Venuti (2021).

In light of the findings of the study, the researchers present the following recommendations:

- Adopting the use of cognitive enhancement therapy in treating cases of autism spectrum disorder.
- Applying cognitive enhancement therapy with small age samples under the age of eight and comparing the results with older ages.
- The current study used a two-group design to answer the study's question. Therefore, the researchers recommend applying cognitive enhancement therapy and investigating its effectiveness by using a single-case design.

REFERENCES

- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders, text revision* (5th ed.), DSM-V.TR. Washington, DC: Author.
- Centers for Disease Control and Prevention. (2023). *Autism spectrum disorder (ASD)*. Centers for Disease Control and Prevention. U.S.A.
- Crooke, P., Winner, M., & Olswang, L. (2016). Thinking Socially: Teaching Social Knowledge to Foster Social Behavioral Change. *Topics in Language Disorders, 16*.
- Didehbani, N., Allen, T., Kandalaf, M., Krawczyk, D., & Chapman, S. (2016). Virtual reality social cognition training for children with high functioning autism. *Computers in Human Behavior, 62*, 703-711.
- Eack, S. M., Greenwald, D. P., Hogarty, S. S., Bahorik, A. L., Litschge, M. Y., Mazefsky, C. A., & Minshew, N. J. (2013). Cognitive enhancement therapy for adults with autism spectrum disorder: Results of an 18-month feasibility study. *Journal of Autism and Developmental Disorders, 43*(12), 2866–2877. <https://doi.org/10.1007/s10803-013-1834-7>
- Eack, S. M., Hogarty, S. S., Greenwald, D. P., Litschge, M. Y., Porton, S. A., Mazefsky, C. A., & Minshew, N. J. (2018). Cognitive enhancement therapy for adult autism spectrum disorder: Results of an 18-month randomized clinical trial. *Autism Research, 11*(3), 519-530. <https://doi.org/10.1002/aur.1913>
- El-Zraigat, I. (2016). *Autism: Behavior, diagnosis, and treatment*. Amman, Jordan: Wael Publishing House.
- El-Zraigat, I. (2020). *Effective interventions with autism spectrum disorder*. Amman, Jordan: Dar Al-Fikr for Publishing and Distribution.
- Gordon, I., Pierce, M., Bartlett, M., & Tanaka, J. (2014). Training facial expression production in children on the autism spectrum. *Journal of Autism and Developmental Disorders, 44*, 2486–2498.
- Hogarty, Q., & Flesher, S. (1999). Practice principles of cognitive enhancement therapy for schizophrenia. *Schizophrenia Bulletin, 25*(4), 693.
- Loehr, J., & Meyers, J. (2009). *Raising your child: The complete illustrated guide*. Fair Winds Press.
- Loehr, J., & Meyers, J. (2014). *Activities to enhance cognitive development: 18-24 months*. Parents. Retrieved from <http://www.parents.com/toddlers-preschoolers/development/activities-for-cognitive-development/#page=3>
- Mubaydheen, B., & El-Zraigat, I. (2019). Assessment of the level of cognitive performance and social interaction among children with autism spectrum disorder in Jordan. *Educational Jordanian Journal*, issued by Educational Jordanian Association, Amman, Jordan.
- Mubaytheen, B. (2018). *The effectiveness of a training program based on cognitive enhancement therapy in developing cognitive performance and social interaction among children with autism spectrum disorder in Jordan*. Unpublished doctoral dissertation, The University of Jordan, Amman, Jordan.
- Pasqualotto, A., Mazzoni, N., Bentenuto, A., Mulè, A., Benso, F., & Venuti, P. (2021). Effects of cognitive training programs on executive function in children and adolescents with autism spectrum disorder: A systematic review. *Brain Sciences, 11*(10), 1280. <https://doi.org/10.3390/brainsci11101280>
- Rump, K., Giovannelli, J., Minshew, N., & Strauss, M. (2009). The development of emotion recognition in individuals with autism. *Child Development, 80*(5), 1434–1447.
- Vick, B. (2014). *Promoting cognitive development through play*. PenfieldBuildingBlocks.org. Penfield Children's Center. Retrieved from <http://www.penfieldbuildingblocks.org>
- William, C., & Wright, B. (2004). *How to live with autism and Asperger syndrome*. London, England: Jessica Kingsley Publishers.
- Yourell, R. (2011). *Plan a cognitive and memory enhancement program*. Retrieved from <https://brainblogger.com/2011/03/07/plan-a-cognitive-and-memory-enhancement-program/>