Paediatrica Indonesiana

p-ISSN 0030-9311; e-ISSN 2338-476X; Vol.64, No.4 (2024). p.339-49; DOI: https://doi.org/10.14238/pi64.4.2024.339-49

Original Article

Effectiveness of a short, intensive, art-based group intervention on attention level in children with autism spectrum disorders: a pre-post experimental study

Deldar Morad Abdulah[1], Bayar Mohammed Omar Abdulla[2], Pranee Liamputtong[3]

Abstract

Background The rate of autism spectrum disorder (ASD) is dramatically rising globally, especially in the Middle East and North Africa. There has been little research on the effects of art-based interventions on attention impairments among children with ASD.

Objective To examine the effectiveness of a short, intensive, art-based intervention on attention switching and attention to detail in children with moderate-severe ASD.

Methods In this pre- and post-experimental study, children previously diagnosed with levels 2 and 3 ASD were invited to join a one-month, art-based course. The art-based intervention was held 3 days/week for 2 hours per day.

Results The mean age of subjects was 8.33 (range 5 to 11) years; there were 10 (83.33%) males and 2 (16.67%) females. The total *Autism Spectrum Quotient* (AQ-Child) scores from baseline to one week after completion of the art-based course were not significantly different. In addition, mean social skills scores of attention switching and attention to detail, as well as communication scores were not significantly changed from baseline to after course completion. However, the children had significantly worse median imagination scores after the course compared to baseline scores (18.0 *vs.* 16.0, respectively) (P=0.0020).

Conclusion After a one-month, art-based, group intervention, AQ-Child scores did not change significantly in total score, social skills, attention switching, attention to detail, or communication. The median imagination score worsened after, compared to before, the intervention. However, these results need to be interpreted with caution due to the very small sample size. **[Paediatr Indones. 2024;64:339-49; DOI: 10.14238/pi64.4.2024.339-49**].

Keywords: *: autistic disorder; attention; art therapy*

Autism spectrum disorder (ASD) refers to a disorder that encompasses deficits in social communication and social interaction, accompanied by restricted, repetitive patterns of behavior, interests, or activities.[1] The four disorders previously known as autistic disorder, Asperger's syndrome, childhood disintegrative disorder (CDD), and pervasive development disorder not otherwise specified (PDD-NOS), are now diagnosed as ASD. Generally, persons living with ASD experience three major burdens: repetitive and self-stimulatory behaviors, difficulty in social interactions, and poor communication skills. Children with ASD experience severe sensitivity or hyposensitivity to particular auditory, visual, and tactile sensations. These lead to restrictions on their ability to engage and interact with the surrounding environment.[1] Difficulties in social interactions include deficits in the usage or comprehension of facial expressions, eye contact, and body postures. These symptoms may not be recognized until later childhood years.[2]

From Community and Maternity Health Nursing Unit, College of Nursing, University of Duhok-Iraq; Kurdistan Region[1], Institute of Fine Arts, Administration of Institutes, Ministry of Education, Duhok-Iraq[2], and College of Health Sciences, Vin University, Gia Lam District, Hanoi, Vietnam.[3]

Corresponding author: Deldar Morad Abdulah. University of Duhok, Nakhoshkhana Road, College of Nursing, Community and Maternity Health Nursing Unit. +9647507443319. Email: deldar.abdulah@uod.ac.

Submitted June 2, 2023. Accepted September 2, 2024.

The global incidence, prevalence, and disability-adjusted life years (DALY) of ASD in children under five years of age were 91.09 per 100,000, 439.39 per 100,000, and 68.67 per 100,000 in 2019, respectively, as reported by the *Global Burden of Disease* (GBD). These numbers showed a substantial increase from 1990 to 2019. The largest increase in prevalence (80.26%) and DALYs (81.24%) occurred in regions with low socio-demographic indices (SDI). Moreover, the ASD burden in male children under five years was about three times that in female children. In 2019, the incidence of ASD in North Africa and the Middle East was 75.36 per 100,000 population, with a prevalence of 363.75 per 100,000 population.[3] A systematic review reported a similar pattern of ASD statistics.[4]

Children with ASD may have congenital brain damage and suffer from several health issues. These issues are troubling in overall development, particularly in interpersonal relations, language, and behavior. Past studies have explored the inner perspectives of autistic children through different therapies. Of these treatments, painting was the most suitable technique for children to express their minds.[5] Expressive art therapies, particularly art-based therapeutic interventions, offer a unique and potentially comprehensive approach to address various symptoms of autism. Art-based interventions may improve the relational capacity of ASD patients. Art therapy may also be used to solve tactile and sensory integration, communication, emotional regulation, and social skills.[6]

Children with autism are regularly referred to art therapy to help them cope with their communication problems, behavioral problems, and low self-esteem.[7,8] The role of art therapy or art-based interventions on symptoms of ASD children has been studied, with systematic reviews suggesting that art therapy may assist children in social communication, as well as restricted and repetitive behavior patterns.[8]

Children with ASD show lowered attention to social perspectives of their environment. ASD children with atypical attention suffer from problems in the development of cognitive and behavioral impairments.[9,10] Impaired attention may result in weak central coherency. Thus, children may remain concentrated on the local features of an object owing to issues of shifting their attention away from it.[10] Less importance has been paid to the effects of art-based interventions on attention impairments among children with ASD. In addition, art therapy in children with moderate-severe ASD has not yet been examined, to the best of our knowledge. Therefore, we aimed to examine the effectiveness of a short, intensive art-based, group intervention on attention switching and attention to detail in children with levels 2 and 3 ASD. We hypothesized that their attention status would improve following the completion of an art-based course.

Methods

In this pre- and post-experimental study, children from the Mental Health Center of Duhok City aged 5-16 years and diagnosed with ASD (levels 2 or 3) were invited to join a one-month, art-based course. Children of either gender with any type of ASD, including autistic disorder, Asperger's syndrome, PDD-NOS, Rett's syndrome, or CDD were eligible to participate in the study, regardless of their socio-demographic status. Of our initial list of 124 children who were screened for eligibility, 56 met the inclusion criteria. Of those 56 children, the parents of 28 children consented to participation. However, only the 13 children were registered for the course by their parents on the first day. The remaining children did not attend the course due to technical or unknown reasons. Of the 13 children registered, one child discontinued the course; the remaining 12 children were included in the study. The children attended the course three days a week for two hours each session, for a total of 11 sessions. On the 12th and last session, the children's artwork was exhibited. Subjects' parents participated in the course as well.

The Mental Health Center in Duhok City was established to diagnose and treat children with psychiatric disorders, and it is the only one of its kind in this region. The center is administered by the Duhok General Directorate of Health in Duhok Province. The art-based intervention was held in one of the halls of the center, on the second floor, with sufficient area to accommodate 15 children. The hall was quiet and devoted to art-based and other psychological interventions.

The level of ASD was determined for all participating children based on their medical

records and parental reports. Children with level 1 ASD require support in social communication, initiating social interaction, as well as organization and planning. Children with level 2 ASD need substantial support, have more pronounced verbal and social communication issues compared to those with level 1 ASD, struggle to shift focus between activities, and show narrow interests and repetitive behaviors that can hinder functioning; they typically use simple sentences and struggle with nonverbal communication. Children with level 3 ASD require even more substantial support, as it is the most severe form of autism. They exhibit several behaviors similar to those with levels 1 and 2, including repetitive behaviors and difficulty with social interactions and focus changes. However, their ability to speak clearly is very limited. They rarely initiate interactions and only respond to very direct social approaches.[11]

Pre-made art templates were given to the children during the art course, with different templates for each session to prevent boredom. **Figure 1** shows six different templates used in the course. One template was a paper with a red circle containing three different circle sizes inside. Another paper had the required circles to fill these empty spaces. The children were given scissors and asked to cut out the circles and place them correctly based on their sizes. On another template, children were asked to draw a line using a pencil, tracing the route of the rabbit to the house, without going outside the route. This template was intended to help increase concentration, as it is a circuitous route. Another template of a happy, non-colorful snail was given; children were asked to color the back of the snail based on the determined colors. This template aimed to increase attention to the colors and specific points. Animal pictures in art-based interventions are useful for engaging children. Another template had dots that were connected in different ways on the front side of the paper, but on the opposite side of the paper, the dots were not connected. We asked the children to connect the dots in the same manner as on the front side. On another template, we asked children to connect a hedgehog to a mushroom. On another template, we

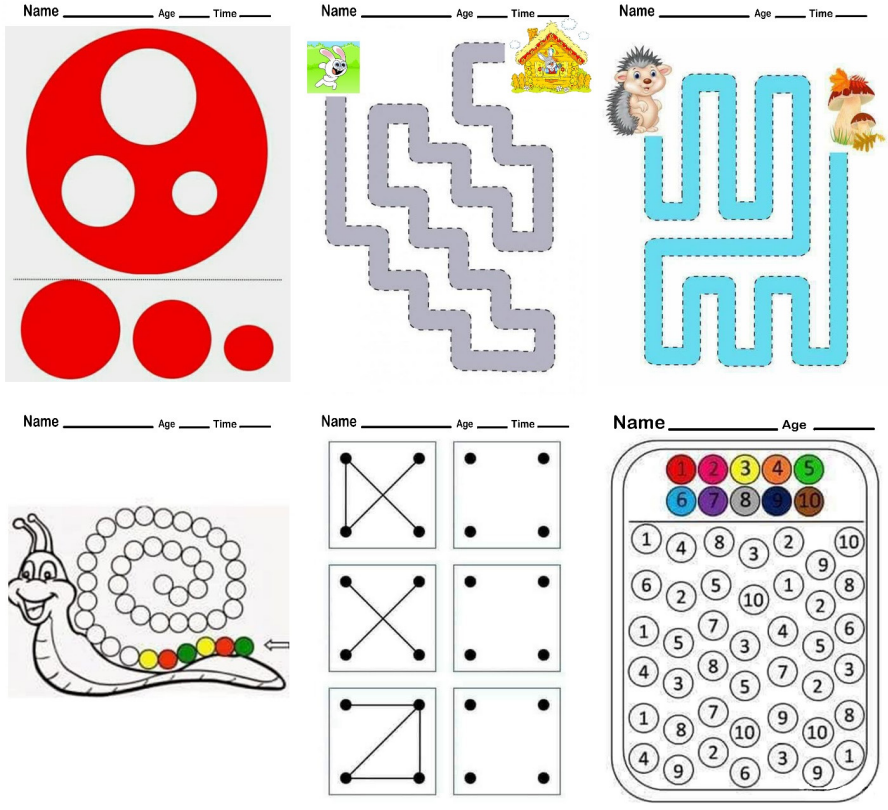

Figure 1. Six templates used in the art-based intervention course

asked the children to color numbers based on the pre-determined color at the top of the paper. This template aimed to increase the focus of the children and learn numbers. The children were asked to fill the circles based on the pattern of colors on the pre-filled circles. In addition, we asked the children to draw the determined signs to increase their attention to lines and routes as made on the paper (**Figure 1**). In another activity, the children were asked to color the tree as they like. The templates were performed along with some handcrafts in the course (**Figure 2**).

A combination of templates and handcrafting practices were given to the children to perform during the course, with a break for children and parents. We gave some of these templates to the parents to work with their children at home. In addition, the interventionist asked the children to insert circles, triangles, and squares through the appropriately shaped holes in a wooden box (**Figure 3**). Children worked in groups when their parents (mother or father or both) were available during the course (**Figure 4**). Also, we trained the children on how to use the pencil and scissors safely.

Figure 2. Some of the art-based materials and artworks during the art-based course

Figure 3. Group work during the art-based course

One artist and one psychologist who were staff members of the mental health center (not investigators) assisted the interventionist in our study. They were trained by the investigators on how to assist them in controlling the children during the course. The trainers had experience working with children at the mental health center for more than five years. Parents also assisted because sometimes the children did not follow instructions or had trouble focusing on the tasks.

To obtain a representative sample of the population, we asked the center to call the parents of all eligible children. We also tried to include patients with different socio-demographic characteristics. To avoid measurement bias, one investigator applied the intervention along with two trainers, and another investigator performed the outcome measurements.

We administered a pre-designed questionnaire consisting of two main sections: (1) general information on age, gender, sleeping hours, medication use, current disease, parents' educational level, and number of family members; (2) autistic traits as measured by the AQ-Child questionnaire. The AQ-Child is a parent-report questionnaire that measures the autistic traits of children aged 4-11 years old. The range of the scores measured by this scale is between 0 and 150. It can be administered to children with ASD and the general population. The scale has 50 items rated on a 4-point

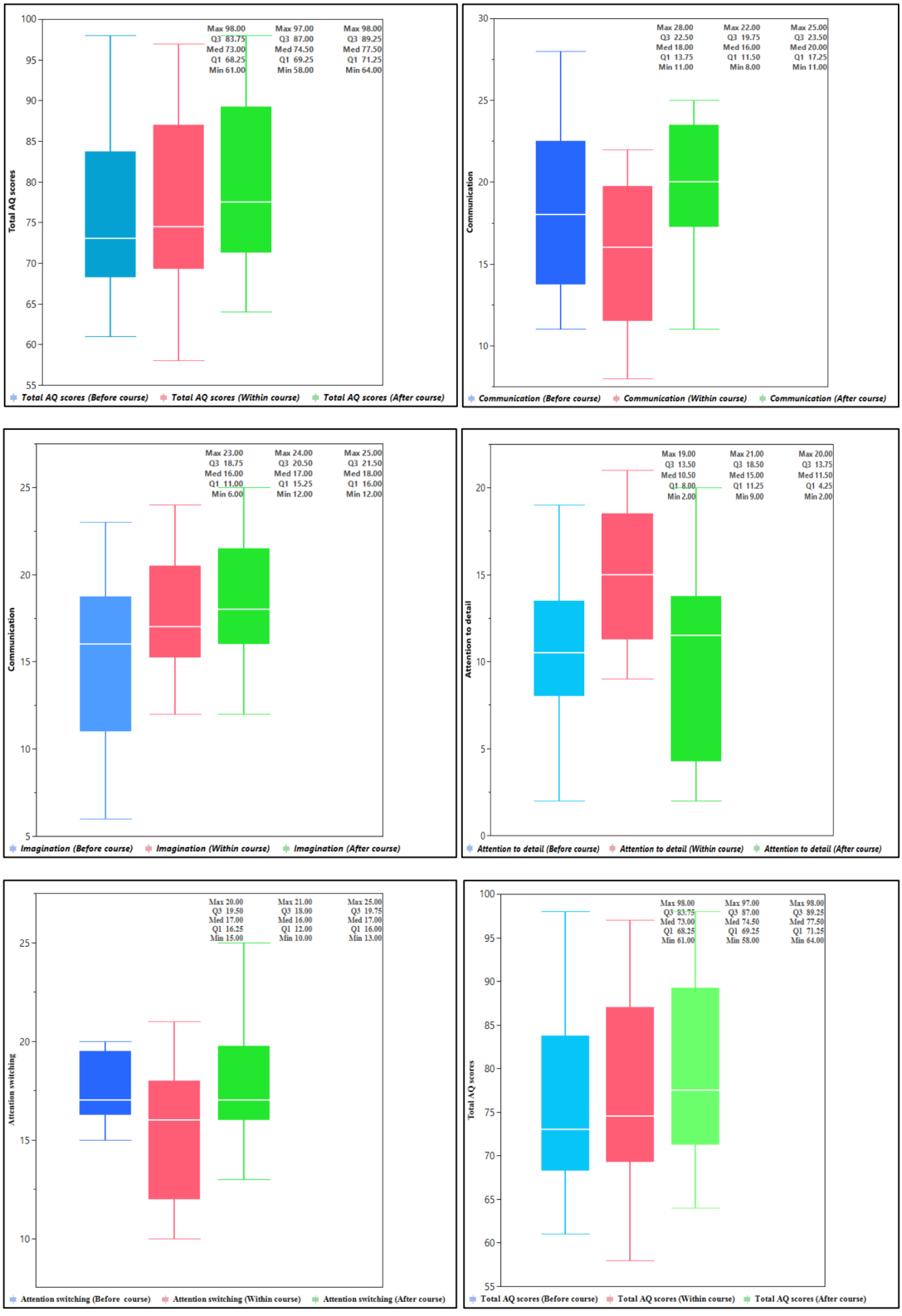

Figure 4. Comparisons of AQ-Child scores between time periods (before, during, and after intervention)

Likert scale, rating from 0 to 3. The AQ-Child has 50 items and a series of descriptive statements established to assess five areas associated with autism and the broader phenotype. The phenotypes are social skills (items 1, 11, 13, 15, 22, 36, 44, 45, 47, 48), attention switching (items 2, 4, 10, 16, 25, 32, 34, 37, 43, 46), attention to detail (items 5, 6, 9, 12, 19, 23, 28, 29, 30, 49), communication (items 7, 17, 18, 26, 27, 31, 33, 35, 38, 39) and imagination (items 3, 8, 14, 20, 21, 24, 40, 41, 42, 50), each represented by ten items. Higher scores correspond to more 'autistic-like' behavior.[12] AQ-Child scores were measured before the art-based course, during the course, and one week after finishing the art-based course.

Descriptive data were presented as frequencies and percentages for nominal data and mean and standard deviation (SD) or median and interquartile range (IQR) for numeric data. The effects of the art-based intervention on autistic traits were examined using the Sign test and presented in boxplots. We used a 95% confidence interval (95%CI) and a P value of <0.05 was considered significant. The comparisons of imagination scores among children with various characteristics after art-based intervention were analyzed using the Wilcoxon or Kruskal-Wallis test. Non-parametric statistical tests were performed due to the small sample size of the study. Statistical analyses were performed using *JMP Pro 14.3.0 software* (*JMP Statistical Discovery LLC*, Cary, North Carolina, USA).

The Scientific Research Division of the Duhok General Directorate of Health in Duhok City approved this study. Parents gave permission for their children to participate before enrollment in the course, but had the right to decline participation or leave the art therapy sessions at any time. The protocol of this study was registered at the Scientific Research Division of Duhok Directorate General of Health in Duhok City.

Results

The mean age of subjects was 8.5 (IQR 3.0) years. There were 10 males and 2 females. The children slept between 8 to 11 hours a night; median duration of sleep was of 8.75 hours a night. Only one child was taking medication. Family size was between four to 14 persons. Most of the parents had a college level of education. Tree children had epilepsy in addition to ASD (**Table 1**).

There was no significant difference in the total median AQ-Child score from baseline to one week after finishing the art-based course. The median scores of social skills, attention switching, attention to detail, and communication as well as total AQ-Child scores were not significantly changed from baseline to after course completion. However, the children had significantly worse median imagination score after the course compared to the baseline score [median (IQR) 18.0 (5.5) vs. 16.0 (7.75), P=0.0020] (**Table 2** and **Figure 4**). There were no significant differences in imagination score post-class between any of the characteristic subgroups (**Table 3**).

Sign test was performed for statistical analyses. The red number shows the significant differences.

Absence rates varied from one to six sessions. Six children attended all sessions, one child missed one session; two children missed three sessions; and one child each missed four, five, and six sessions. Due to our small sample size, we did not exclude children with absences.

Discussion

Our children had worse median imagination scores after the course compared to baseline. However, the art-based intervention did not significantly change the scores for social skills, attention switching, attention to detail, communication, or the total AQ-Child score. Children diagnosed with ASD have qualitative limitations in social communication skills. They often have stereotypic and repetitive patterns in behavior, interests, and activities.[13] ASD children have atypical ways of information processing. According to Schweizer *et al*.[14] there are three concepts of information processing in children with ASD. The first concept is the theory of mind, which refers to difficulties in understanding feelings, thoughts, ideas, and intentions of themselves and others.[15] The second concept is related to deficits in executive functioning, meaning that children with ASD have issues with planning and cognitive flexibility.[16] The third concept is weak central coherence, which means that the child is unable to analyze details as part of a broader context or system. Atypical sensory processing is a core feature and appears as high or low sensitivity to

Table 1. General and medical characteristics of children participating in the study (N=12)

Characteristic	Estimate	95% CI
Age (5-11 years)		7.11 to 9.55
Mean (SD)	8.33 (1.92)	
Median (IQR)	8.5 (3.0)	
Gender, n (%)		
Male	10 (83.33)	55.20 to 95.30
Female	2 (16.67)	4.70 to 44.80
Sleeping hours (8-11 hrs)		8.31 to 9.52
Mean (SD)	8.92 (0.95)	
Median (IQR)	8.75 (1.5)	
Concurrent epilepsy, n (%)		
Yes	3 (25.0)	8.89 to 53.23
No	9 (75.0)	46.77 to 91.11
Medication, n (%)		
Yes	1 (8.33)	1.49 to 35.39
No	11 (91.67)	64.61 to 98.51
Paternal education, n (%)		
Illiterate	3 (25.00)	8.89 to 53.23
Less than high school	4 (33.33)	13.81 to 60.94
College	5 (41.67)	19.33 to 68.05
Maternal education, n (%)		
Illiterate	6 (50.00)	25.38 to 74.62
Less than high school	1 (8.33)	1.49 to 35.39
College	5 (41.67)	19.33 to 68.05
Family size (4-16 members)		4.75 to 9.42
Mean (SD)	7.08 (3.68)	
Median (IQR)	5.5 (2.75)	
Family size, n (%)		
3-6 members	8 (66.67)	39.06 to 86.19
>6 members	4 (33.33)	13.81 to 60.94

Table 2. Comparisons of attention and its dimensions between, within, and after course

Attention (n=12)	Time median (IQR)			P value		
	Before course	Within course	After course	Before *vs.* within	Within *vs.* after	Before *vs.* after
Social skills	15.5 (6.5)	15 (6.25)	13.5 (5.75)	0.2266	0.3877	0.2266
Attention switching	17 (3.25)	16 (6.0)	17 (3.75)	0.5488	0.5488	0.7539
Attention to detail	10.5 (5.5)	15 (7.25)	11.5 (9.5)	0.1460	0.7744	0.5078
Communication	18 (8.75)	16 (8.25)	20 (6.25)	0.2266	0.0654	0.3877
Imagination	16 (7.75)	17 (5.25)	18 (5.5)	0.7539	0.3488	0.0020
Total AQ scores	73 (15.5)	74.5 (17.75)	77.5 (18)	0.7744	1.000	0.1460

Sign test was performed for statistical analyses. The red number shows the significant differences.

environmental stimuli.[17,18]

A systematic review of studies conducted between 1985 and 2012 aimed to determine core elements of art therapy for normal/highly intelligent children with ASD up to 18 years. The study analyzed 18 descriptive case studies based on the *Context Outcomes Art Therapy* (COAT) model. The review showed that art therapy may be effective in adding more flexible and relaxed perceptions, better imagination, and improved communicative and learning skills in children with ASD. The study emphasized that art therapy may help reduce two main health issues: social communicative issues as well as restricted and repetitive behavior patterns. In addition, they found that typical art

Table 3. Analysis of imagination scores by characteristics after art-based intervention

Characteristics	Imagination	
	Median (IQR)	P value
Gender[a]		0.5178[a]
Male	18.0 (5.25)	
Female	20.5 (7.0)	
Current disease[a]		0.0635[a]
Epilepsy	24 (7.0)	
No	17 (5.0)	
Paternal education[b]		0.5378[b]
Illiterate	16 (6.0)	
Less than high school	19 (10.25)	
College	18 (6.5)	
Maternal education[b]		0.8800[b]
Illiterate	17.5 (5.25)	
Less than high school	18 (0.0)	
College	18 (10.0)	
Family size[a]		0.7982[a]
3-6 members	18 (6.5)	
>6 members	18 (7.75)	

[a]Wilcoxon test; [b]Kruskal-Wallis tests were performed for statistical analyses

therapeutic elements like sensory experiences with sight and touch improved social behavior, flexibility, and attention abilities of children with ASD.[8] Another study that examined the effectiveness of drawing among 9 children with ASD showed that art therapy improved participants' cognitive, social, and motor skills.[19] Art can act as a bridge between children with ASD and the world. Another study recommended creative art-making activities to assist ASD children to be mindful of themselves and associate with their environment. The participants observed, recognized, and understood the world as seen in their art. Giving children the authority to select the materials and participate in art therapy provides an environment for them to express their thoughts and feelings.[20] In our study, we selected the materials for participants because children with moderate to severe ASD cannot choose their favorite art materials on their own.

One previous study claimed that a basic expectation from art therapy is improvement in motor skills, since the children are given opportunities to practice their motor skills and sensory integration through art media, tools, and various creative activities. They suggested that this improvement was due to using their coping skills and hand-eye coordination in art activities like tearing, cutting, drawing, and touching new materials. Sensory-based activities are considered to be effective in managing and adjusting new materials and reducing oversensitivity to the world.[19] Yet another study suggested that motor coordination is the preliminary step to taking part in a multistep project and group art activities.[21]

We tried to avoid measurement bias as much as possible in our study. In this regard, the art-based intervention and measurements were applied by two independent authors. However, the study was not exempt from limitations. The findings reported in this study may not be comparable to findings reported elsewhere because we included children with moderate to severe ASD. In addition, we did not employ a professionally trained art therapist for the art course. Moreover, the type of art-based intervention applied to children in this study may have had different effects. We did not examine their home and school environments. Nor did we include a control group due to technical issues. The worsened effect of the art-based sessions on imagination may have been related to absenteeism, as three children had a high number of absences (4-6 sessions). The absences could also be the reason that there were no significant differences in any of the parameters before and after the class.

We recommend that an art therapist be involved

in future studies and that the children attend art-therapy sessions for a longer period of time because a one-month art intervention may not be sufficient to change the AQ-Child scores. Researchers should encourage parents to bring their children to the art-based sessions as much as possible to increase adherence, as it is considered the main barrier to the implementation of the art-therapy sessions. Using different art-based activities during the sessions could be a solution to the low adherence. In this regard, we suggest some physical activities along with some attractive art-based sessions.

In our study, the median imagination scores of children with ASD worsened after art-based intervention compared to before the intervention. However, pre- and post-intervention scores of social skills, attention switching, attention to detail, and communication, and total AQ scores were not significantly different. Our results need to be interpreted with caution due to the very small sample size. More studies are needed to determine the best art-based intervention models to improve behavioral limitations in children with ASD.

Conflict of interest

None declared.

Acknowledgments

We would like to express our deep thanks to the Mental Health Center and Duhok General Directorate of Health in Duhok City for their support and assistance.

Funding acknowledgment

This work was supported by the Duhok General Directorate of Health as a health promotion activity for children with autism spectrum disorders.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders DSM-5™. 5th ed. Washington DC: American Psychiatric Publishing; 2013. DOI: https://doi.org/10.1176/appi.books.9780890425596
2. Richard DA, More W, Joy SP. Recognizing emotions: testing an intervention for children with autism spectrum disorders. Art Therapy. 2015;32:13-19. DOI: https://doi.org/10.1080/07421656.2014.994163
3. Kang L, Liu J, Liu Y, Liang W, Yang F, Liu M. Global, regional, and national disease burden of ASD among children under 5 years from 1990 to 2019: an analysis for the Global Burden of Disease 2019 Study. Asian J Psychiatr. 2023;79:103359. DOI: https://doi.org/10.1016/j.ajp.2022.103359
4. Li YA, Chen ZJ, Li XD, Gu MH, Xia N, Gong C, *et al*. Epidemiology of autism spectrum disorders: Global burden of disease 2019 and bibliometric analysis of risk factors. Frontiers Pediatr. 2022: 10:972809. DOI: https://doi.org/10.3389/fped.2022.972809
5. Bi W, Wu J, Lin R. Research on the case of art therapy and cognition of autistic children. World Journal of Social Science Research. 2018;5:172. DOI: https://doi.org/10.22158/wjssr.v5n2p172
6. Holmes H. The use of art therapy to address attachment in autism spectrum disorder. 2020. Expressive Therapies Capstone Theses. 316. https://digitalcommons.lesley.edu/expressive_theses/316.
7. Martin N. Art therapy and autism: overview and recommendations. Art Therapy. 2009;26:187-90. DOI: https://doi.org/10.1080/07421656.2009.10129616
8. Schweizer C, Knorth EJ, Spreen M. Art therapy with children with autism spectrum disorders: a review of clinical case descriptions on 'what works'. The Arts in Psychotherapy. 2014;41:577-93. DOI: https://doi.org/10.1016/j.aip.2014.10.009
9. Allen G, Courchesne E. Attention function and dysfunction in autism. FrontBiosci. 2001;6:D105-19. DOI: https://doi.org/10.2741/A598
10. Keehn B, Müller R-A, Townsend J. Atypical attentional networks and the emergence of autism. NeurosciBiobehav Rev. 2013;37:164-83. DOI: https://doi.org/10.1016/j.neubiorev.2012.11.014
11. Masi A, DeMayo MM, Glozier N, Guastella AJ. An overview of autism spectrum disorder, heterogeneity and treatment options. Neurosc Bull. 2017;33:183-93. DOI: https://doi.org/10.1007/s12264-017-0100-y
12. Auyeung B, Baron-Cohen S, Wheelwright S, Allison C. The autism spectrum quotient: Children's version (AQ-Child). J Autism Dev Disord. 2008;38:1230-40. DOI: https://doi.org/10.1007/s10803-007-0504-z
13. Carter MJ. Diagnostic and statistical manual of mental

disorders. Ther RecreJ. 2014;48:275. DOI: https://doi/book/10.1176/appi.books.9780890425596

14. Schweizer C, Spreen M, Knorth EJ. Exploring what works in art therapy with children with autism: tacit knowledge of art therapists. Art Therapy. 2017;34:183-91. DOI: https://doi.org/10.1080/07421656.2017.1392760
15. Baron-Cohen S. Theory of mind and autism: a fifteen year review. In: Baron-Cohen S, Tager-Flusberg H & Cohen DJ (editors). Understanding other minds: perspectives from developmental cognitive neuroscience. New York, NY: Oxford University Press; 2000. p. 3-20. DOI: https://doi.org/10.1093/oso/9780198524465.003.0001
16. Ozonoff S, Pennington BF, Rogers SJ. Executive function deficits in high-functioning autistic individuals: relationship to theory of mind. J Child Psychol Psychiatry. 1991;32:1081-105. DOI: https://doi.org/10.1111/j.1469-7610.1991.tb00351.x
17. Mottron L, Dawson M, Soulières I, Hubert B, Burack J. Enhanced perceptual functioning in autism: an update, and eight principles of autistic perception. J Autism Dev Disord. 2006;36:27-43. DOI: https://doi.org/10.1007/s10803-005-0040-7
18. Rozga A, Anderson S, Robins DL. Major current neuropsychological theories of ASD. In: Fein D, editor. The neuropsychology of autism. Chapter: Autism Neuropsychological Theory: A Review. Oxford: Oxford University Press; 2011. p. 97-122. PMID: 8813299.
19. Koo J, Thomas E. Art therapy for children with autism spectrum disorder in India. Art Therapy. 2019;36:209-14. DOI: https://doi.org/10.1080/07421656.2019.1644755
20. Emery MJ. Art therapy as an intervention for autism. Art Therapy. 2004;21:143-7. DOI: https://doi.org/10.1080/07421656.2004.10129500
21. Gabriels RL. Art therapy with children who have autism and their families. In: Malchiodi CA, editor. Handbook of art therapy. New York: The Guilford Press; 2003. p.193-206. URL: https://www.amazon.com/Handbook-Art-Therapy-Cathy-Malchiodi/dp/1572308095