

# The effectiveness of art therapy with painting approach in enhancing attention, concentration and visual spatial working memory in children with learning disabilities

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## Abstract

**Aim:** The present study aimed to investigate the effectiveness of art therapy using painting in enhancing attention, concentration, and visual-spatial working memory in children with learning disabilities. **Method:** The research method was a semi-experimental pre-test post-test with a control group. The statistical population of the study was children with learning disabilities in Isfahan in 1403. Initially, 30 children with learning disabilities were selected by convenience sampling from Ardabil learning disability centers and randomly assigned to two experimental and control groups (15 people in each group), and the experimental group received painting training for 8 sessions. The data were analyzed using the analysis of covariance method in SPSS-25 software. **Findings:** The results showed that art therapy intervention with a painting approach had a significant effect on scores in enhancing attention, concentration, and visual-spatial working memory in children with learning disabilities. **Conclusion:** Overall, the results of this study showed that art therapy can improve attention, concentration, and visual working memory in children with learning disabilities. Therefore, it is recommended that painting therapy be used alongside other treatment methods for children with learning disabilities.

**Keywords:** Art therapy, painting approach, attention and concentration, visual working memory, learning disability

## Introduction

Art therapy has been widely used and, despite its positive clinical results, has rarely been studied (Hosseini Sadr et al., 2022). Children love and enjoy painting. These methods increase the child's socialization process and increase the child's autonomy and self-concept (Mohammadi et al., 2023). Therefore, painting, as a dynamic and uplifting visual category, has always been considered as a factor in the growth and development of children (Gadamzan and Nazeri, 2019). Children with learning disabilities are a group of people who face problems in the learning process. These problems can include problems with attention and concentration, visual space, and working memory. These problems can have a great impact on children's academic performance and social development. For these children, finding effective methods to improve these skills is very important (Keyvanlo et al., 2022). One of the ways that may be used to improve attention and concentration, visual space, and working memory in children with learning disabilities is art therapy with a painting approach. The purpose of this study is to investigate the effectiveness of art therapy with a painting approach on strengthening attention and concentration, visual space, and working memory in children with learning disabilities.

Art therapy is a multifaceted therapeutic approach that uses artistic activities such as painting, music, drama, and other artistic activities to improve and strengthen the psychological, social, and even physical state of individuals. The main goal of art therapy through artistic activities is to increase creativity, improve self-awareness, strengthen human relationships, and increase the individual's psychological and social abilities. In recent years, the issue of inability to understand and learn subjects such as reading, writing, and mathematics has attracted the attention of many scientists and education professionals. According to published statistics, the number of students with learning disabilities is reported to be between 4 and 12 percent (Ghanbari (2015) The term learning disability was first introduced in 1962 by Samuel Kirk. He considered learning disability to be a type of cognitive impairment in which students have difficulty in one of the mental areas such as understanding speech, writing, listening, reading, or arithmetic, Afroz (2015). Attention and concentration refer to a person's ability to focus on a specific activity and maintain attention for the duration of that activity. This skill is essential for performing daily tasks, learning effectively, and having successful performance in different environments.

Working visual spatial memory is a type of memory that is related to the storage and retrieval of visual and spatial information that a person uses during various activities, such as solving problems and understanding concepts. This type of memory helps a person's ability to visualize and structure spatial information. Visual motor skills are one of the most important components of visual perception. Visual-motor skills refer to the coordination of visual data with motor output. Visual-spatial abilities, visual analysis, and visual-motor integration are crucial for the development of visual-motor skills. Visual-spatial working memory, as one of the types of working memory of the brain, plays a fundamental role in processes related to problem solving, decision-making, and problem solving. This type of memory helps a person remember and access information by using mental images and spatial situations (Baddeley et al 2015). The use of painting as an art

therapy tool in improving and strengthening psychological and social problems of individuals has been investigated. This artistic method is used as a means to express and enhance the feelings, experiences, and thoughts hidden in the minds of individuals.

Studies have shown that painting as a creative and expressive activity can have a significant improvement in anxiety, depression, and psychological stress. This artistic activity not only helps people express their feelings, but also facilitates the process of concentration, memory training, and a richer mental experience (Malchiodi 2012). In art therapy using painting, various methods and techniques are used to promote and improve the psychological and social state of individuals. These methods are implemented in order to activate creativity, visualize emotions, and facilitate the process of communication with oneself and others. Some of the art therapy methods using painting include: - Interactive painting, Micropainting, Disillusioned painting.

Dadkhah et al. (2013) examined the effectiveness of art therapy with a painting approach on controlling emotions and attention span of students with attention deficit hyperactivity disorder and noted that data analysis showed that art therapy with a painting approach is effective on controlling emotions and attention span of students with attention deficit hyperactivity disorder. Art therapy can be an effective therapeutic approach to improve the control of emotions and attention span of students with attention deficit hyperactivity disorder.

Mikaeili & Saeedi (2022) examined the effectiveness of art therapy based on painting therapy on children's emotions and noted that art therapy based on painting therapy is effective on various emotions, including anger and happiness, as well as regulating children's emotions. In addition, painting therapy has a positive effect on improving emotional problems and disorders such as anxiety and depression. According to a review of studies, it was found that the use of painting therapy is an effective method for improving the emotional health of children, and it is necessary to make more widespread use of this therapeutic technique as a relatively inexpensive and easy treatment for all groups, especially the more vulnerable groups such as children.

In 2018, Jahan Tigh examined the effectiveness of painting therapy on reducing the symptoms of ADHD and pointed out that the benefits of painting therapy can be expressed as follows: First, painting makes it possible to directly express dreams, imaginations, and other personal experiences in the form of images. Second, visual representations of unconscious content are more easily expressed and reduce impulsive, hyperactive, and inattentive behaviors in students with ADHD. Therefore, it is better for teachers and parents to be informed of the benefits of this type of treatment, which is relatively inexpensive and feasible, and to receive the necessary training and encouragement to use it.

In 2012, Hosseini Sadr et al. investigated the effectiveness of mindfulness-based painting therapy on emotional expression in female students with test anxiety disorder and indicated that based on the findings of the present study, the use of mindfulness-based painting therapy training is recommended as a psychological intervention to improve the mental and physical conditions of children with test anxiety. In 2017, Hertrampf investigated the effect of creative art therapy and art medicine on psychological outcomes in women with breast cancer or gynecological cancer: a systematic review of art-based

interventions and indicated that breast cancer and gynecological cancer are the two major diagnoses of women worldwide. Clinical research on art-based approaches for these populations has received increasing attention in the past decade with promising results. The aims of this study were (a) to review the evidence of art-based approaches including creative art therapy (CAT) and art medicine (AM) on psychological outcomes in women from both populations and (b) to evaluate art-based reporting. Interventions This systematic review examined randomised trials and quasi-randomised controlled studies with repeated measures. The researchers assessed each study for risk of bias using Tool. A checklist called Reporting of Arts-Based Interventions was developed and applied to all studies included in the review. The researchers calculated effect sizes for relevant outcomes. The searches identified 294 articles, which yielded 104 non-duplicate titles. Twenty-one articles met the inclusion criteria. These included 1703 participants (83.1% breast cancer, 16.9% gynecological cancers). CAT was used in 10 articles (n = 646). AM was used in 11 (n = 1057). For gynecological cancers, only two AM studies were found and no CAT studies were identified. Anxiety and depression were the most common outcomes for both approaches across all studies. Overall, small to large effect sizes were found for AM studies and zero to large effect sizes were found for CAT studies. Body image and sexuality were rarely addressed. Intervention reporting was inadequate. Results suggest that art-based interventions may be effective in improving psychological outcomes for target populations. Research is recommended for women with cancer, as are trials aimed at improving body image and addressing sexual function and related concerns. Improving the quality of intervention methodology and reporting is critical. Lima (2023) reviewed a study titled How Art Therapy and Expressive Therapy Complexes Can Be Used to Enhance Executive Functioning Skills: A Review of the Literature, and noted that it examined the relationship between the Expressive Therapy Continuum (ETC) and executive function skills. Findings suggest that the use of ETC has the potential to help develop executive function in children, thus preparing them for a successful future. The use of ETC also fills the gap in creative short-term interventions designed to enhance executive function skills. ETC provides instructions at each level that target different executive functioning skills. The latest findings show how ETC can be used to enhance executive functioning in clients with Alzheimer's disease and attention deficit hyperactivity disorder (ADHD), both of which are causes of executive dysfunction.

In 2020, Wang reviewed the progress of art therapy for patients with dementia, noting that this article introduces the theoretical foundations and development status of art therapy, and reviews the intervention methods and effectiveness of art therapy in patients with dementia. To date, the mod Nursing care through art therapy with dementia patients in China has rarely been studied, and the design of this type of research needs to be improved. In 2023, Etemadzadeh examined the effectiveness of play therapy in improving attention and working memory in students with specific learning disabilities and noted that the results indicate that play therapy can be an effective intervention to improve academic achievement by enhancing attention and working memory in students with specific learning disabilities.

In 2023, Shahin examined the effectiveness of painting therapy and music therapy on sleep quality, pain intensity, and behavioral disorders in children with cancer and noted that, as a result, since the complications of diagnosis and aggressive drug treatments are very stressful for children with cancer, the use of non-pharmacological approaches appropriate to the capacity of children, including music therapy and art therapy, is useful in reducing their physical and psychological problems. Therefore, the aim of the present study was to evaluate the effect of art therapy with a painting approach on visual-spatial working memory in children with learning disabilities.

### **Methodology**

The present research method will be experimental and pre-test post-test with a control group. The present research population will include all children with learning disabilities in Ardabil in 1403 who have referred to learning disability centers. Statistical sample and sampling method: 30 people and available data will be selected as available and will be placed in two experimental and control groups (15 people in each group) by simple randomization.

### **Instrument**

**Martin Art Therapy Protocol:** Art therapy with a painting approach was implemented by the researcher for 8 weeks, 1 session each session lasting 45 minutes for the experimental group in Ardabil learning disorders centers, and at the beginning of each session, the desired concept was explained to the group members for 5 minutes. Art therapy with a painting approach was not implemented on the control group. In order to teach art therapy with a painting approach, the Martin (2009) educational package was used, the validity of which was confirmed. University professors in the field of education and rehabilitation of children with special needs confirmed the face and apparent validity of the educational package. In addition, using the content validity ratio index, the correlation coefficient of the checklist scores completed by university professors was 0.82, confirming the content validity of the educational package (Faramarzi & Moradi, 2014).

### **procedure**

After obtaining permission and a letter of introduction from the university, the student will be referred to the Ardabil City Center for Learning Disorders. Considering that at least 15 people are required for experimental research in two groups, the experimental and control groups (Delavar, 1401), children with learning disabilities will be selected. Next, by stating the purpose of the research, a pre-test will be taken and the experimental group received intervention. After completing the intervention sessions, a post-test will be taken from the two groups. The data will finally be analyzed through SPSS to examine the intervention in the experimental and control groups. Inclusion criteria in this study:

children 6-12 years old, willingness to participate in the research, consent form, exclusion criteria: physical problems, unwillingness to participate in the research.

Table 1: Structure of Art Therapy Sessions

Session	Title	Activity
Session 1	Drawing different emotions	Drawing a person, happy, sad, scared, angry, and surprised
Session 2	Drawing group members	Look at each member of your group and draw them as you see them
Session 3	What makes me sad	Draw anything that makes you feel sad.
Session 4	Drawing the animal you would like to be	Draw the shape of the animal you would like to be
Session 5	Drawing a group mural	Children draw a large drawing on a very large piece of paper as a group without specifying a specific topic.
Session 6	Drawing what they like in nature	Draw what you like in nature.
Session 7	Drawing the body	Draw your body
Session 8	How do you imagine yourself	Draw a picture of yourself as you imagine it.

## Results

Demographic characteristics of the samples include age, gender, and economic status. The average age of children in the experimental group is 9.5 years and in the control group is 9.7 years. The gender distribution in both groups is approximately equal, and the economic status of the samples is also categorized as high, medium, and low. To assess the impact of art therapy education using a painting approach on enhancing attention, concentration, and visual-spatial working memory in children with learning disabilities, descriptive indices were initially calculated. Then, to analyze the data and test the hypotheses, repeated measures ANOVA was used..

Table 2: Descriptive Statistics of Pre-test and Post-test Scores

Variable	Group	Number	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Follow-up Mean	Follow-up SD
Enhancement of attention, concentration, and visual-spatial working memory	Control	15	12.80	1.699	14.53	2.973	14.87	3.159
	Experimental	15	12.73	1.944	19.27	3.357	19.53	3.357

According to Table 2, the mean and standard deviation of scores for enhancing attention, concentration, and visual-spatial working memory in the control and experimental groups at the pre-test stage do not differ significantly. However, there is a significant difference between the mean and standard deviation of the pre-test and post-test scores in the

experimental group. Given that the differences in mean and standard deviation between the experimental and control groups at the pre-test stage were minor, the mean and standard deviation of emotional recognition scores in the control and experimental groups at the post-test stage differ and are presented. The mean and standard deviation of post-test scores for the experimental group do not differ significantly from the follow-up scores.

Given that the assumptions of score distribution normality and equality of variances, along with the Box's test, are fundamental assumptions for conducting multivariate tests such as repeated measures ANOVA, the results of the Shapiro-Wilk test for pre-test scores of the variable enhancing attention, concentration, and visual-spatial working memory for both experimental and control groups are presented in Table 3.

Table 3: Shapiro-Wilk Test Results

Variable	Group	Statistic	Degree of Freedom	Significance
Enhancement of attention, concentration, and visual-spatial working memory	Control	0.960	15	0.696
	Experimental	0.936	15	0.334

According to Table 3, the significance level of the Shapiro-Wilk test for the variable enhancing attention, concentration, and visual-spatial working memory in both control and experimental groups is greater than ( $P > 0.05$ ). Therefore, the assumption of normality is confirmed.

Table 4: ANOVA Test with Repeated Measures

Dependent Variable	Source	Sum of Squares	Degree of Freedom	Mean Square	F	Significance	Effect Size	Power
Enhancement of attention, concentration, and visual-spatial working memory	Group Membership	21964.844	1	21963.844	1499.867	0.0001	0.982	1
	Error	217.778	28	14.644	14.871	0.001	0.347	0.961

According to Table 4, at the post-test stage, there is a significant difference in scores between the experimental and control groups ( $P > 0.05$ ), and art therapy with a painting approach has significantly impacted the enhancement of attention, concentration, and visual-spatial working memory scores in the post-test stage. Therefore, the research hypothesis is confirmed, indicating that art therapy with a painting approach has increased the scores for enhancing attention, concentration, and visual-spatial working memory. The intervention's effect on enhancing attention, concentration, and visual-spatial

working memory is 34 percent, indicating that 34 percent of the individual differences in enhancement scores between the experimental and control groups at the post-test stage are due to the intervention. Additionally, the statistical power is greater than 0.8, indicating that the sample size is sufficient.

Table 5: Pre-test and Post-test Variables

Variable	Group	B	Standard Error	T	Significance	Effect Size	Power
Pre-test enhancement of attention, concentration, and visual-spatial working memory	Control						
	Experimental	0.067	0.667	0.100	0.921	0.0001	0.051
Post-test enhancement of attention, concentration, and visual-spatial working memory	Control						
	Experimental	-4.733	4.080	0.0001	0.347	0.160	0.976
Pre-test enhancement of attention, concentration, and visual-spatial working memory	Control						
	Experimental	-4.667	1.190	-3.921	0.001	0.354	0.966

According to the table above, there is no significant difference in the mean enhancement of attention, concentration, and visual-spatial working memory between the experimental and control groups at the pre-test stage. Overall, the findings of this study indicate that art therapy education with a painting approach affects the enhancement of attention, concentration, and visual-spatial working memory in children with learning disabilities.

## Discussion

The present study aimed to evaluate the effectiveness of art therapy education with a painting approach in enhancing attention, concentration, and visual-spatial working memory in children with learning disabilities. The results of this study showed that art therapy intervention with a painting approach had a significant effect on scores in enhancing attention, concentration, and visual-spatial working memory in children with learning disabilities. This finding is consistent with some of the findings of Panesi & Morra, (2022), Podobnik, et al. (2024)., Hu et al. (2021), Gordon (2024). In explaining and explaining these results, it can be said that given that the lack of skills in recognizing, interpreting, and expressing emotions is one of the main obstacles to establishing intimate relationships for children with learning disabilities (Ahmadi et al, 2024); among the needs of children with learning disabilities who often have difficulty recognizing emotions and regulating emotions (Hu et al, 2021), there is an increase in strengthening attention, concentration, and visual-spatial working memory in children with learning disabilities.

Drawing and creating artwork for a child with learning disabilities causes appropriate brain activity and emotional development of his brain function, thereby reducing visual perception abnormalities and reducing unusual brain responses in processing facial emotions. When drawing, the preschool child's ability to recognize emotions and feelings through colors increases, while the artistic style does not affect the child's recognition of emotions (Au et al, 2024). Using art therapy, a child with learning disabilities finds a way to increase understanding by strengthening attention, concentration, and visual-spatial working memory (Podobnik, et al 2024).

In fact, art helps to create abstract thoughts and understand concepts, enhance attention and concentration, and visual-spatial working memory in children with learning disabilities. When an autistic child and another person draw at the same time, they must learn to separate themselves from others and pay attention to their spatial expressions by drawing other people's faces (Howes et al,2022) In group art therapy programs, children show more emotions in their relationships with their friends and appropriate strategies in dealing with conflict situations with their friends (Panesi & Morra, 2022). Considering that research shows that the preverbal skills training program has an effect on increasing and improving mutual social interaction of high-functioning children with learning disabilities and is stable over time. (Karkou et al, 2023). Therefore, by implementing art therapy, it is possible to help a child with learning disabilities strengthen their attention, concentration, and visual-spatial working memory by using drawing.

## Conclusion

In conclusion, regarding the achievements of this research, it can be concluded that various methods and strategies have been developed so far to strengthen attention, concentration, and visual-spatial working memory in children with learning disabilities. Therefore, these children often face problems in social skills, and high concentration Also the problem. In the field of working with these children, choosing another important treatment method that can primarily lead to establishing a relationship with these children and attract them to carry out the treatment method and its continuation, and ultimately be effective and useful for solving the problems of these children, is a very important issue. By making children interested in applying the skills of concentration and increasing accuracy that they already have in their behavioral repertoire and adding new behaviors to their behavioral repertoire, painting therapy can help improve social skills and strengthen attention, concentration, and visual-spatial working memory in children with learning disabilities. In addition to creating and encouraging the use of skills, it can also affect their interest and interest in academic fields. Since painting is the most important way to enter the world of children, in this way it is possible to both understand the problems of children more and take steps to solve these problems to some extent. Given the low cost and availability of therapeutic painting intervention, the lack of need for expert educators, the ability to be used in various time and place situations, its great appeal to children, its interest in painting, and its effectiveness in various groups and situations,

therapists and specialists in the field of child and adolescent mental health can benefit from this method.

This study, like other studies, has limitations, including that a specific type of learning disability was not controlled for in this study, and variables such as family environment, parental education level, and environmental supports may not have been controlled for, which could affect the results. Therefore, it is suggested that future studies control a specific type of learning disability to examine the effect of art therapy with a painting approach on that specific type of learning disability. The results of this study can be used in the development of educational and artistic programs for children with learning disabilities. Schools can use these programs to strengthen children's attention, concentration, and visual-spatial working memory. Finally, the results of this study can be used in specialized clinics to design appropriate treatment programs for children with learning disabilities. Clinics can recommend art therapy programs with a painting approach as one of the treatment methods.

### **Disclosure Statements**

The authors report no potential conflicts of interest.

### **ORCID**

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