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Effectiveness of Eye Movement Desensitization and Reprocessing (EMDR) Therapy on Selective Attention and Creativity in Children with ADHD

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A B S T R A C T

Purpose: The present study aimed to examine the effectiveness of Eye Movement Desensitization and Reprocessing (EMDR) therapy on selective attention and creativity in children with ADHD.

Methods and Materials: In this randomized controlled clinical trial, 60 children diagnosed with ADHD were randomly assigned to two groups: an EMDR treatment group (n = 30) and a control group (n = 30). The Stroop Color-Word Test (SCWT) and the Children's Creativity Questionnaire as rated by teachers (Saatchi et al., 2011) were administered at both pre-test and post-test stages. The experimental group received 12 sessions of EMDR therapy, each lasting 75–90 minutes, while the control group received no intervention during this period. The data were analyzed with ANCOVA using SPSS.

Findings: Findings from the analysis of covariance indicated the effectiveness of the EMDR protocol in both components—selective attention and creativity (P < .001).

Conclusion: Based on the results, it can be concluded that EMDR, due to its impact on reducing anxiety and fear-related somatic symptoms, can be effective in improving selective attention and enhancing creativity in children with ADHD.

Keywords: *Attention-Deficit/Hyperactivity Disorder, Selective Attention, Eye Movement Desensitization and Reprocessing, Creativity.*

1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common neurodevelopmental disorder in childhood. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR), ADHD is characterized by the presence of three core symptoms: inattention, hyperactivity, and impulsivity. It is described as a persistent pattern of behavior that impairs normal development or daily functioning and negatively affects academic performance (American Psychiatric Association, 2022). ADHD is among the most frequently diagnosed disorders in the pediatric population, and an increasing trend in its prevalence has been reported in recent years (Li et al., 2025; Li et al., 2023). Meta-analyses have estimated a prevalence rate between 5% and 10% in children and adolescents (Salari et al., 2023; Thomas et al., 2015; Wang et al., 2017). Additionally, there is a five- to ten-fold increased risk of developing ADHD in individuals with a family history of the disorder (Shafiullah & Dhaneshwar, 2025).

The symptoms of ADHD often persist into adulthood. In a six-year longitudinal study involving children aged 5 to 13 years with ADHD, researchers found that inattention symptoms remained through adolescence, while hyperactivity and impulsivity decreased with age (Holbrook et al., 2016). Moreover, it should be noted that children with ADHD, compared to typically developing peers, experience weaker interpersonal, parent-child, and sibling relationships and lower academic achievement, leading to low self-esteem, poor self-evaluation, negative emotions, and other adverse consequences (Barkley et al., 2002). In general, these children are more likely to drop out of school, engage in low-skilled occupations, participate in antisocial activities and high-risk situations, and show relational and conflict issues with peers and family members (Gonzalez-Carpio et al., 2017).

As noted, one of the most significant symptoms of ADHD is attentional deficit. Attention refers to a set of cognitive processes that determine which stimuli are selected for further processing. Componential models of attention (Gomes et al., 2000; Mirsky et al., 1991; Petersen & Posner, 2012) explain this complex system by dividing it into distinct parts. In these models, both selective and sustained attention are considered shared components. Selective attention is the unconscious process of focusing on specific information while ignoring others, whereas sustained attention refers to maintaining this focus over an extended period. Abnormal brain structure in ADHD results in altered neural mechanisms such as cognition, attention, and memory function. The mesolimbic, nigrostriatal, and mesocortical pathways are affected by decreased dopamine levels, and the dopamine hypothesis of ADHD suggests that attentional deficits and disrupted arousal functions are due to dopamine deficiencies (Shafiullah & Dhaneshwar, 2025). It is therefore unsurprising that individuals with ADHD are more likely to seek clinical support due to attention-related issues in school environments, and a strong link exists between attentional performance and academic achievement in children with ADHD (Gray et al., 2017; Levy et al., 2025).

Whether children with ADHD exhibit greater creative potential compared to typically developing children remains unclear (Paek et al., 2016). However, the hypothesis is intriguing in that it highlights positive traits in children with ADHD (Gonzalez-Carpio et al., 2017). Creativity is defined as an individual's ability to generate novel and potentially useful ideas or solutions across various contexts (Sternberg & Lubart, 1996; Sternberg & Kaufman, 2010). Despite numerous theories of creativity (Runco, 2014), there appears to be consensus that originality and usefulness are two key components of the creative process (Plucker et al., 2004; Runco, 2014; Sternberg & Lubart, 1996). Originality refers to a statistically rare or unique response, while usefulness indicates the capacity to achieve a goal in a specific context. According to Simonton, the concept of creativity involves a tendency to think beyond conventional norms, seek novelty and the unconventional, and a willingness to embrace experience (Simonton, 2004). Thus, creative individuals often display traits such as diffuse attention, divergent thinking, and a preference for independence and nonconformity. Such functioning can also be observed in individuals with ADHD. Cramond warned about the potential overlap between the behavioral characteristics of creative children and those with ADHD (Cramond, 1994), and Sternberg and Kaufman highlighted the risk of failing to identify creative individuals whose potential is masked by ADHD symptoms (Sternberg & Kaufman, 2010). The relationship between ADHD and creativity is thought to be rooted in overlapping cognitive or neural traits. Moreover, intellectual ability is a factor that may influence creativity, and according to Jauk et al. (2014), creativity is linked to intelligence and the transformation of acquired skills or knowledge into creative accomplishments (Jauk et al., 2014).

Traditional intervention strategies for treating ADHD typically include a combination of pharmacotherapy,

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psychotherapy, and environmental adjustments in home, educational, and occupational settings (Sibley et al., 2025). However, one treatment approach that has shown promise in alleviating the symptoms of this disorder is Eye Movement Desensitization and Reprocessing (EMDR) therapy (Guidetti et al., 2023). EMDR is a psychotherapeutic approach developed by Francine Shapiro in 1987 and consists of eight phases based on the Adaptive Information Processing model. The eight core phases of EMDR include: history taking and treatment planning, preparation, assessment, desensitization, installation, body scan, closure, and reevaluation. Originally developed for the treatment of post-traumatic stress disorder (PTSD) and supported by empirical evidence, EMDR has recently been explored as a promising alternative treatment for various disorders, including ADHD (Gomes et al., 2000; Guidetti et al., 2023; Sarichloo et al., 2020). A study conducted in 2014 reported that EMDR was effective in reducing anxiety and anger while increasing self-confidence in children with ADHD (Mi-Seon & Young-Hye, 2014). Similarly, Guidetti and colleagues found EMDR to be a promising treatment—particularly for children with ADHD who have experienced trauma—when used in conjunction with pharmacological therapy. Accordingly, EMDR therapists have proposed its application in children with comorbid conditions such as ADHD (Adler-Tapia & Settle, 2008; Swinden, 2018). Nevertheless, the number of studies in this area remains limited. Therefore, given the chronic nature of ADHD symptoms and their extensive impact on individuals and families, the present study aimed to investigate the effectiveness of EMDR therapy on selective attention and creativity in children with ADHD.

2. Methods and Materials

2.1. Study Design and Participants

In this randomized controlled clinical trial, children diagnosed with ADHD in Tehran who were referred for psychotherapy by psychiatrists during the years 2024–2025 were studied. The sample size was determined to be 50 participants (25 in each group) based on Cohen's table. Due to the anticipated dropout rate, 30 patients were randomly assigned to each group using an alternating odd-even referral sequence. Ultimately, 28 participants in the EMDR group completed the treatment sessions. There were 4 dropouts in this group due to unwillingness to continue treatment. Due to the lack of eligibility criteria, the presence of exclusion criteria, and time constraints, it was not possible to replace the dropouts with new participants.

Inclusion criteria were: a primary diagnosis of ADHD based on structured clinical interviews, age between 10 and 12 years, enrollment in elementary school, and submission of written informed consent. Exclusion criteria included: unwillingness to continue treatment at any stage of the intervention, current or past comorbid psychiatric disorders, substance or alcohol abuse, active suicidal ideation, psychiatric conditions due to medical issues or personality disorders, and having received any type of psychotherapy within the past six months or concurrently during the study period.

Participants in both groups had been receiving standard medication for ADHD for more than six months with insufficient treatment response and were still using the medication during the study. The experimental group underwent 12 EMDR therapy sessions, each lasting 75–90 minutes, administered by a therapist with 23 years of EMDR experience. No intervention was administered to the control group during this period.

2.2. Measures

2.2.1. Selective Attention

Stroop Color-Word Test (SCWT) was developed by McLeod in 1996 and is a cognitive test designed to assess selective attention and executive functioning. Participants are asked to identify the color of a word while ignoring the word's meaning—especially when the meaning contradicts the ink color. This test is frequently used to evaluate cognitive flexibility and interference control. Multiple studies have used the SCWT alongside other assessments like the Continuous Performance Test to evaluate various cognitive functions, including attention and working memory. Its test-retest reliability across all three trials has been reported as 0.01, 0.83, and 0.90, respectively (Bulut et al., 2024; Darvishi et al., 2021).

2.2.2. Creativity

This questionnaire was derived from Abedi's standard creativity questionnaire. It consists of 30 items, each with three response options reflecting low to high creativity, scored from 1 to 3. The scores are grouped into four dimensions—fluency, originality, flexibility, and elaboration—comprising 8, 10, 6, and 6 items, respectively. Each subscale score is calculated by summing the items and

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dividing by the number of items, and the total score is computed by averaging all item scores. The possible total scores range from 30 to 90, with higher scores indicating higher creativity. Cronbach's alpha coefficients for the subscales are 0.75 (fluency), 0.67 (originality), 0.61 (flexibility), and 0.61 (elaboration). Using the principal component method, item-test congruence in each subscale was examined. All four dimensions showed relatively high correlations (between 0.55 and 0.85) with the first latent factor. Each subscale's primary factor explained between 50% and 60% of total item variance, indicating good internal consistency and construct validity. To assess the test's validity, two distinct methods were applied: first, classical Pearson correlations with criterion measures, and second, confirmatory factor analysis. The results of the CFA supported acceptable concurrent validity for the creativity questionnaire (Saatchi, Mahmoud, 2011).

2.3. Intervention

2.3.1. Eye Movement Desensitization and Reprocessing

Based on Shapiro's Adaptive Information Processing model, EMDR conceptualizes psychiatric disorders as manifestations of unresolved and traumatic events. EMDR treatment consists of an eight-phase protocol: (1) History-taking and case formulation. (2) Preparation, aimed at ensuring the client possesses adequate resources to manage the distressing information being processed in pursuit of an adaptive resolution. (3) Identification of visual, cognitive (both negative and preferred positive cognitions), emotional, and sensory elements of the target memory/memories, along with measurement of distress levels (SUDs) and the validity of positive cognition (VoC). (4) Activation of the target memory or intrusive thought while simultaneously administering sets of eye movements (or alternating bilateral auditory or tactile stimulation). This continues until the SUD level and the strength of the negative cognition are reduced to zero. A memory is considered fully processed when it no longer evokes emotional or physical distress in the client. (5) Installation of a valid positive cognition using further bilateral stimulation. Reinforcement of positive beliefs is a core EMDR component, achieved by focusing on the client's self-evaluation, which is vital for a positive therapeutic effect. (6) Completion occurs when the client can recall the target memory and the positive cognition without experiencing bodily tension. (7) Careful session closure after the client's tension has decreased. (8) Reevaluation, which is also repeated at the beginning of the next session.

2.4. Data Analysis

Descriptive statistics, the Kolmogorov-Smirnov test for normality of distribution, linearity tests for pretest-posttest score correlations, Levene's test for homogeneity of variances, analysis of covariance (ANCOVA), and effect size calculations were conducted. Data were analyzed using SPSS version 26.

3. Findings and Results

A total of 28 participants in the EMDR group completed the treatment sessions. Demographic data for both groups are presented in Table 1.

Table 1

Demographic Information of the Sample by Experimental and Control Groups

Variable		EMDR Group		Control Group		Significance Level
		Frequency	Percent	Frequency	Percent	
Gender	Female	7	25%	11	36.66%	.09
	Male	21	75%	19	63.34%	
Age	10 years	6	21.42%	5	16.66%	.65
	11 years	13	46.42%	16	53.34%	
	12 years	9	32.14%	9	30%	
Family History	Yes	18	64.28%	16	53.34%	.18
	No	10	35.72%	14	46.66%	

In both groups, the majority of participants were male, aged 11, and had a family history of the disorder. The Chi-square test revealed no significant differences in any of the demographic characteristics between the two groups (P > .05). The means and standard deviations of the study variables by group are presented in Table 2.

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Table 2

Means and Standard Deviations of Selective Attention and Creativity in EMDR and Control Groups

Variable	Time Point	EMDR Group M (SD)	Control Group M (SD)
Selective Attention	Pre-test	67.24 (3.26)	70.68 (4.11)
	Post-test	95.00 (3.30)	54.35 (3.41)
Creativity	Pre-test	37.71 (3.04)	33.14 (1.92)
	Post-test	45.58 (7.98)	31.33 (1.29)

Table 2 shows that the mean score of selective attention in the control group decreased from pre-test to post-test, while it increased in the experimental group. Regarding creativity, the mean creativity score increased in the EMDR group from pre-test to post-test, while it decreased in the control group.

Given that the significance level of the Kolmogorov–Smirnov test for all post-test scores was greater than .05, the assumption of normal distribution was accepted. Furthermore, based on the linearity test of the correlation between pre-test and post-test scores, the F-values of pre-test scores were significant at the .05 level, indicating that the assumption of correlation between pre-test and post-test scores was met.

Levene's test was used to examine the homogeneity of variances in pre-test and post-test scores. The significance level for all scores was greater than .05, confirming the null hypothesis and indicating homogeneity of variances. With all preliminary assumptions met, analysis of covariance (ANCOVA) was conducted to test the hypotheses, as presented in Table 3. The obtained Pillai's trace was .56787, which was significant ($P < .001$), indicating a significant effect of EMDR treatment on both selective attention and creativity.

Table 3

Analysis of Covariance for Selective Attention and Creativity Comparing EMDR and Control Groups

Variable	Source	Sum of Squares	df	Mean Square	F	p	Partial η^2
Selective Attention	Intercept	1411.65	1	1411.65	160.42	.000	.74
	Pre-test	144.13	1	144.13	16.38	.000	.23
	Group (Intervention)	9947.45	1	9947.45	1130.48	.000	.95
	Error	475.16	54	8.79			
Creativity	Intercept	97.19	1	97.19	3.03	.08	.05
	Pre-test	36.22	1	36.22	1.13	.29	.02
	Group (Intervention)	1540.34	1	1540.34	48.05	.000	.47
	Error	1731.02	54	32.05			

As shown in Table 3, the group effect was statistically significant for both variables ($P < .001$). This indicates that EMDR treatment led to increased selective attention and creativity in the experimental group compared to the control group.

4. Discussion and Conclusion

The findings of this study indicated that EMDR therapy is effective in enhancing selective attention and creativity in children with ADHD. Although only a limited number of international studies have explored the effectiveness of EMDR in treating ADHD symptoms, their findings are consistent. For instance, Guidetti and colleagues demonstrated that EMDR, in addition to pharmacological treatments, can be a promising intervention for children with ADHD who have a history of traumatic experiences (Guidetti et al., 2023). Davidson reported two clinical cases in which resolving triggers stemming from life experiences through EMDR therapy led to the alleviation of ADHD symptoms and discontinuation of stimulant medications (Davidson, 2024). Similarly, Gokcen and colleagues reported the improvement of a 9-year-old boy diagnosed with ADHD and a history of sexual abuse following EMDR treatment (Guidetti et al., 2023; Karagiorgos, 2024).

Regarding the effectiveness of EMDR on selective attention in children with ADHD, it can be argued that these children often face failure and criticism at home and in school, which may lead to the accumulation of negative emotions and traumatic memories. These emotional burdens can disrupt attention and lead to distractibility. Thus,

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targeting these experiences—especially traumatic ones—helps reduce anxiety-related arousal, which in turn contributes to improved selective attention and creativity scores. In this context, Abadi (2010) found that EMDR reduces avoidance, fear, and physiological arousal (Abadi, 2010). Khanjani and colleagues (2017) also demonstrated that EMDR is effective in reducing phobic avoidance symptoms (Khanjani et al., 2017). Additionally, ADHD is frequently associated with emotional dysregulation, where intense negative emotions can capture attention and interfere with task focus (Strauss & Allen, 2009). Moreover, disruptions in information processing in the brains of children with ADHD can cause difficulties in selective attention (Salum et al., 2014). However, EMDR facilitates the reprocessing of distressing memories and associated emotions, allowing individuals to cognitively restructure them in a way that diminishes their emotional intensity and traumatic impact. During the recall of distressing memories, the therapist guides the client through bilateral stimulation—such as eye movements, auditory tones, or tactile cues. This dual-attention stimulation supports memory processing in a way that mirrors REM sleep, helping the individual desensitize to the emotional charge of the memory. The memory is then reconsolidated with changes in how it is stored and perceived. This process often results in a reduction in the intensity of negative emotions.

In terms of EMDR's effect on creativity in children with ADHD, it is important to note that although EMDR is not explicitly designed to enhance creativity, several aspects of the therapy can indirectly facilitate creative expression. On one hand, anxiety and stress are significant barriers to creativity, as they restrict focus and provoke fear of failure (Miraka & Tritsaroli, 2019). By reducing anxiety and stress, EMDR creates a safer internal environment where individuals feel more secure in exploring new ideas, taking risks, and learning from mistakes. This more open and receptive mental state fosters creative thinking. On the other hand, the enhancement of attention and concentration through EMDR may also contribute to greater creativity. High levels of focus and attention are essential for creativity, as individuals who can concentrate deeply on a problem are more likely to develop innovative solutions and ideas. Furthermore, EMDR may promote creativity by improving self-awareness and self-efficacy. It helps individuals gain better insight into their emotions and thoughts, which in turn enhances self-confidence, self-efficacy, and self-acceptance (Karagiorgos, 2024). Supporting this notion, Staring and colleagues found that EMDR therapy increased self-esteem in patients with anxiety disorders (Staring et al., 2016). Likewise, Hekmatiyan Fard and colleagues reported that EMDR training reduced public speaking anxiety and social anxiety while improving academic self-efficacy in university students.

Although the small sample size may limit the generalizability of the findings to broader populations, further studies could reveal how EMDR impacts ADHD symptoms and indirectly contributes to enhanced creativity. Based on the present findings, it is recommended that further empirical studies be conducted in this area—particularly in Iran, where a significant research gap exists and no prior interventions have been reported. Additionally, clinics and counseling centers could consider implementing this promising therapeutic approach to help clients reduce the adverse effects of negative memories and accumulated emotional distress.

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.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance

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of the research before the start of the interview and participated in the research with informed consent.

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