

# The reducing effect of eye movement desensitization and reprocessing treatment on exam anxiety in students

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## ABSTRACT

**Objectives:** The purpose of the study was to examine the efficacy of eye movement desensitization and reprocessing therapy in the treatment of exam anxiety in high school students in the 11<sup>th</sup> grade.

**Materials and methods:** Between April 10, 2022 and June 15, 2022, a total of 40 students (20 males, 20 females; mean age: 17 years) and 20 students as the control group (10 males, 10 females; mean age: 17 years) were included in the study. Test Anxiety Inventory (TAI) was given to both groups as a post-test after the application of eye movement desensitization and reprocessing (EMDR) therapy to the experimental group with the aim of having zero subjective units of the disturbance scale. The Wilcoxon signed-rank test was used to analyze and interpret the TAI results.

**Results:** Gender differences between girls and boys students were found to have no effect on test anxiety. When  $p \leq 0.05$  was taken in the control group, no statistically significant difference was found when comparing pre-test to post-test. There was a statistically significant difference between the anxiety pre-test and post-test ranking averages of boys in the experimental group;  $z = -2.805$ ;  $p < 0.01$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages. There was a statistically significant difference between the anxiety pre-test and post-test ranking means of the overall sample;  $z = -3.411$ ;  $p < 0.01$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

**Conclusion:** As a result of the evaluation of the satisfaction questionnaire administered to the students, it was observed that the students in the experimental group were more positive, hopeful, and calm in the feedback received from parents, students, and teachers in the school environment. After evaluating all of the evidence and observations, it is concluded that EMDR therapy is a useful strategy for reducing young people's test anxiety.

**Keywords:** Adolescence, EMDR, exam anxiety.

Eye movement desensitization and reprocessing (EMDR) is a psychotherapy method developed by the American psychologist Francine Shapiro.<sup>[1]</sup> It is a psychological method used in the treatment of trauma symptoms, grief, chronic pain, and other problems, in addition to emotional problems caused by disturbing life experiences such as accidents, war stress, harassment, natural disasters, or sad childhood

events, phobia, performance anxiety, panic disorder, body perception disorder. Although the choice of profession is a turning point in the lives of young people, there is a lot of psychological pressure and anxiety on them before the university exam. This anxiety is exacerbated by the individual's negative past life experiences, cognitions, or traumas.<sup>[2]</sup> The biochemical balance of the brain's information processing system is disturbed by this situation. This deterioration prevents the information from being resolved by adapting it to the system and causes individuals to experience performance anxiety and examination anxiety. Since EMDR therapy alters the client's cognition and behavior, it helps the person in building better and more positive social connections with others and learning coping mechanisms for dealing with problems in life.<sup>[3]</sup>

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Besides psychological approaches to EMDR therapy, there are also biological explanations. Eye movement desensitization and reprocessing therapy is thought to have a biological effect on the limbic system and amygdala.<sup>[4]</sup>

EMDR therapy is an eight-phase treatment method. Disturbing memory networks in the client's memory records are reached through EMDR therapy. Thus, the processing of these unprocessed memories by the mind is accelerated. It focuses on the cognitive, emotional, and physical reactions of the client in the memory records.<sup>[5]</sup> In EMDR therapy, while working with the client, the disturbing moment, image, and picture are first determined, and the work begins with a bilateral warning (bidirectional).<sup>[2]</sup>

It has been demonstrated that EMDR therapy and similar eye movements reduce the vitality of emotions and images associated with memory. The highest level of the mind is activated by bidirectional arousal, and a sense of relief is felt as the information is processed. In EMDR treatment, different EMDR protocols are used depending on the situation and diagnosis. The application of EMDR in a structured protocol plays an important role in increasing the effectiveness of the treatment.<sup>[6]</sup> The client's memories of the past are stimulated during this process, along with the current events that brought back those memories and the pleasant experiences that made the client want to live in the future. While this process is ongoing, the client can gain insight and develop new connections by noticing changes in memories. Processing is thought to be the establishment of harmonious connections between information networks stored in the brain. This therapy allows the disconnected links to be reconnected.<sup>[2]</sup> Using EMDR treatment, it is aimed to reduce test anxiety in young people who will take the university entrance exam.

Eye movement desensitization and reprocessing treatment is used to treat emotional problems, somatic disorders, relationship problems, self-esteem issues, traumatic events, cognitive problems, smell disorders, body dysmorphic disorder, panic, and sexual function issues.<sup>[7]</sup> The standard EMDR protocol, first developed by Shapiro,<sup>[1]</sup> has been refined over time by psychotherapists working with various

psychological issues. Studies have revealed that EMDR therapy is not only effective in the treatment of post-traumatic stress disorder (PTSD), but also in the treatment of a wide range of other psychiatric disorders.<sup>[8-10]</sup>

Eye movement desensitization and reprocessing therapy is one of the most studied psychological approaches for PTSD. Since 1989, approximately 20 controlled studies have been conducted using the EMDR method.<sup>[11]</sup>

Empirical studies have shown that EMDR is one of the most effective treatment methods for PTSD and is much more effective than other treatments for trauma-related disorders.<sup>[12]</sup> Furthermore, it is used in situations such as specific phobia,<sup>[13]</sup> performance anxiety,<sup>[14]</sup> and grief.<sup>[15]</sup>

According to controlled studies, EMDR therapy has similar results to exposure or other cognitive behavioral treatment approaches, with a greater effect than control groups that received no treatment or nonspecific therapy.<sup>[16,17]</sup> The treatment has been shown to be effective in children with problems such as trauma symptoms,<sup>[18]</sup> and chronic pain.<sup>[19,20]</sup>

Our study examined the efficacy of EMDR therapy on exam anxiety in high school students in the 11<sup>th</sup> grade.

## MATERIALS AND METHODS

This experimental study was conducted at Yahya Kemal Beyatlı Anatolian High School in Ankara to observe how EMDR treatment affects test anxiety in 11<sup>th</sup> grade students between April 10, 2022 and June 15, 2022.

A total of 40 students (20 males, 20 females; mean age: 17 years) and 20 students as the control group (10 males, 10 females; mean age: 17 years) were included in the study.

The experimental and control groups were formed by randomly selecting students with a high level of anxiety and roughly equal demographic characteristics. Eye movement desensitization and reprocessing therapy was applied to the experimental group with the aim of having zero from subjective units of the disturbance scale and after the application, test anxiety inventory (TAI) was administered to both groups as a post-test. This inventory included 20 questions on

a 4-point Likert scale.<sup>[21]</sup> The TAI results were analyzed and interpreted using the Wilcoxon signed-rank test, which is a non-parametric statistical test.

### Satisfaction survey

To assess the general satisfaction of those taking part in the study, a satisfaction questionnaire with five questions was prepared. This questionnaire was applied to the experimental group. They stated that the interview resulted in a significant reduction in their anxiety levels, based on their responses to the 5-question satisfaction questionnaire for feedback on the study.

### Statistical analysis

The collected data were transferred to a computer and analyzed using the SPSS for Windows version 24.0 software (IBM Corp., Armonk, NY, USA). After the data were classified, the normal distribution assumption was tested. It was observed that the data distribution was not normal, so nonparametric tests were used. For the demographic information of the sample, frequency analysis for the person and percentage distribution, descriptive table for scale scores and open-ended variables, and Wilcoxon signed-rank test (controlling for random sample) for the difference between pre-test and post-test scores were used.

## RESULTS

The socio-demographic structures of the students who participated in the study are shown in Table 1.

The general anxiety score of the sample of 40 people was 42-63 points (mean= 48.30±4.439), the total anxiety score of the girls was 45-54 points (mean= 48.90±2.573), and the total anxiety score of the boys was 63 points (mean= 47.70±5.750).

The general anxiety score of the sample in the study with 40 people was in the range of 25-61 (mean= 40.18±10.313), the total anxiety score of the girls was in the range of 25-54 (mean= 39.25±9.743), the total anxiety score of the boys was in the range of 27-61 (mean= 41.10±11.026), as shown in Table 2.

As shown in Table 3, there is a statistically significant difference between the anxiety pre-test and post-test mean rankings of the general sample;  $z=-3.411$ ;  $p<0.01$ . Pre-test anxiety mean scores were higher than post-test anxiety mean scores.

Table 4 shows that there is a statistically significant difference between the anxiety pre-test and post-test ranking averages of the girls;  $z=-2.903$ ;  $p<0.01$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

**Table 1.** Descriptive statistical table for pre-test overall scores and sample total scores for girls and boys

Variables	Number of people	Smallest value	Greatest value	Mean±SD
Overall Anxiety Score	40	42	63	48.30±4.439
Girl's Anxiety Total Score	20	45	54	48.90±2.573
Boy's Anxiety Total Score	20	42	63	47.70±5.750

SD: Standard deviation.

**Table 2.** Descriptive statistical table for the final test overall, girls and boys total scores of the sample

Variables	Number of people	Smallest value	Greatest value	Mean±SD
Overall Anxiety Score	40	25	61	40.18±10.313
Girl's Anxiety Total Score	20	25	54	39.25±9.743
Boy's Anxiety Total Score	20	27	61	41.10±11.026

SD: Standard deviation.

**Table 3.** Examination of the difference in the general pre-post test total scores with the Wilcoxon signed-rank test

		n	Rank average Rank Total	Rank average Rank Total	z	p
General pre-post Test Anxiety Scores	Negative rank	26				
			23.29	605.50		
	Positive rank	12			-3.411	0.001*
			11.29	135.50		
	Equal	2				

\* p≤0.005.

**Table 4.** Examination of the difference in the pre-post test total scores of the girls with the Wilcoxon signed-rank test

		n	Rank average	Rank	z	p
Pre-post Test Anxiety Scores of girls	Negative rank	1				
			11.93	167.00		
	Positive rank	5			-2.903	0.004*
			4.60	23.00		
	Equal	1				

\* p≤0.005.

**Table 5.** Examination of the difference in boy's pre-post test total scores by Wilcoxon signed-rank test

		n	Rank average	Rank	z	p
Pre-post Test Anxiety Scores of boys	Negative rank	1				
			12.04	144.50		
	Positive rank	7			-1.993	0.046*
			6.50	45.50		
	Equal	1				

\* p≤0.005.

**Table 6.** Examination of the difference in the pre-post test total scores of the experimental group with the Wilcoxon signed-rank test

		n	Rank average	Rank	z	p
Experimental group Pre-Post-Test Anxiety Scores	Negative order	2				
			10.50	210.00		
	Positive order	0			-3.924	0.000*
			0.00	0.00		
	Equal	0				

\* p&lt;0.001.

**Table 7.** Examination of the difference in the pre-post test total scores of the girls in the experimental group using the Wilcoxon signed-rank test

	n	Order mean	Order total	z	p	
Examination of the difference between the pre-post test total score	Negative order	1				
	Positive order	0	5.50	55.00	-2.810	0.005*
	Equal	0	0.00	0.00		

\* p≤0.005.

**Table 8.** Examination of the difference in the pre-post test total scores of the boys in the experimental group using the Wilcoxon signed-rank test

	n	Order mean	Order total	z	p	
Experimental group Pre-post-test Anxiety Scores	Negative order	1				
	Positive order	0	5.50	55.00	-2.805	0.005*
	Equal	0	0.00	0.00		

\* p≤0.005.

**Table 9.** Examination of the difference in the pre-post test total scores of the boys in the control group using the Wilcoxon signed-rank test

	n	Rank average	Rank	z	p	
Control group Pre-Post-Test Anxiety Scores	Negative order	2				
	Positive order	7	2.25	4.50	-2.136	0.033*
	Equal	1	5.79	40.50		

\* p≤0.0005.

Table 5 shows that there is a statistically significant difference between the anxiety pre-test and post-test ranking averages of boys;  $z=-1.993$ ;  $p<0.05$ . The pre-test anxiety ranking averages were higher than the post-test anxiety ranking averages.

Table 6 shows that there is a statistically significant difference between the anxiety pre-test and post-test ranking averages of the experimental group;  $z=-3.924$ ;  $p<0.001$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

As shown in Table 7, there is a statistically significant difference between the anxiety pre-test and post-test ranking averages of the girls in the experimental group;  $z=-2.810$ ;  $p<0.01$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

As shown in Table 8, there is a statistically significant difference between the anxiety pre-test and post-test rank averages of the boys in the experimental group;  $z=-2.805$ ;  $p<0.01$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

As shown in Table 9, there is a statistically significant difference between the anxiety pre-test and post-test ranking averages of the boys in the control group;  $z=-2,136$ ;  $p<0.05$ . Pre-test anxiety ranking averages were higher than post-test anxiety ranking averages.

## DISCUSSION

Students preparing for college and high school are particularly affected by exam anxiety. The fear of performance and success forms the basis of this anxiety, which keeps students from exhibiting their full potential.<sup>[22]</sup> In our study, we established an experimental group of 20 people and a control group of 20 people to observe the effectiveness of the EMDR treatment, and the pre-test/post-test scores for test anxiety scores were compared.

As a result of the analysis, the EMDR therapy was applied to the experimental group, and it was found that there was a significant difference in test anxiety scores. Furthermore, the anxiety scores of all girls and boys in the experimental group decreased at the end of the application. According to the findings, the EMDR treatment, is an effective method for reducing test anxiety in students.<sup>[23]</sup>

The EMDR treatment allows for the processing of memories that have become stuck in a person's mind and have been isolated.<sup>[24]</sup> It provides an observable physiological basis in situations where negative physical sensations such as test anxiety increase. It enables the brain to perform operations that it could not perform functionally during and after the memory occurred.<sup>[25]</sup> There is a relationship between stuck memory and other memories and networks. Since learning is possible, the stimulus and information in question can also be learned. Thus, it is expected that the person taking the exam will no longer be bothered by the qualifications and features of the exam. Its goal is to functionally characterize memory. The individual will be motivated to take the exam with enough anxiety to gain from this.<sup>[26]</sup>

Field index studies have shown that EMDR therapy is effective for a variety of anxiety disorders.<sup>[12,18,27]</sup> There are also studies that show the functionality of the EMDR treatment for test anxiety and performance anxiety.<sup>[14,28]</sup>

The target of EMDR therapy is not only to eliminate physical symptoms such as fainting and fever related to the exam but also to gain a new perspective. It is also ensured that the exam-related beliefs and thoughts are functional. According to our analyses, there is a significant difference between the experimental group's test anxiety scores before and after the EMDR treatment. The average pre-test anxiety score was higher than the average post-test anxiety score.

Maxfield et al.<sup>[16]</sup> measured test anxiety before and after the EMDR session in a similar study published in the literature. It was emphasized that anxiety had decreased as a result. Furthermore, the anxiety scores of all girls and boys in the experimental group decreased at the end of the application. The anxiety levels of girls were found to be higher in studies than those of boys. EMDR treatment, its efficacy in various anxiety disorders, and field index studies have all been demonstrated.<sup>[29-33]</sup>

In their study, Stevens and Florell<sup>[33]</sup> used rational-emotive therapy (RET) and EMDR therapy on 62 exam-anxious undergraduates. EMDR therapy was the most effective at reducing anxiety in the final test, while RET reduced overall testing anxiety. The blinding treatment was used for the reliability of the therapist, and perceptions of the efficacy of the treatment guided the results.

In their study on the relationship between test anxiety and EMDR therapy, Cook-Vienot and Taylor<sup>[34]</sup> emphasized that the EMDR method can be determined as an important method in reducing test anxiety. According to the literature, EMDR therapy is effective in reducing test anxiety in both one- and two-session treatment procedures. So much so that Enright et al.<sup>[35]</sup> randomly assigned 35 college students with test anxiety to either a treatment or a delayed treatment group. EMDR therapy has been shown to be effective in reducing test anxiety as well as the "emotion" and "anxiety" components of test anxiety, and overall test anxiety. It has been stated that EMDR applications for the treatment of test anxiety are in high demand.<sup>[36]</sup>

In a recent study of 50 participants, it was found that EMDR therapy effectiveness was emphasized, particularly in reducing anxiety

about physical performance.<sup>[37]</sup> It has been stated that EMDR protocols are beneficial in reducing anxiety. In this regard, it is possible to state that the obtained results support the literature and are preliminary for Türkiye.

It is possible that the effect of EMDR treatment on the amygdala and limbic system is the cause of its effectiveness.<sup>[4]</sup> The processing of the emotional center of the brain and the learning of control reduce internal tension and exam anxiety. In addition, the fact that anxiety is an emotion and is perceived as the result of false thoughts held by the person falls under the purview of EMDR therapy. Given that cognition and emotion are both components of test anxiety, the effectiveness of EMDR therapy is not surprising. This is because cognitively thinking about the exam and preoccupation, as well as emotionally increased tension, fear, and physical sensations, are considered concurrently. EMDR therapy interacts with and reprograms perceptual and cognitive elements like emotions and thoughts.<sup>[38]</sup> Bilateral brain stimulation is used to recreate sessions, false beliefs, and distorted thoughts. It is processed, and an attempt is made to form a positive cognition instead of negative cognition.

Neuroimaging studies clearly demonstrate that EMDR therapy causes changes in hippocampal volume, which is important for memory storage.<sup>[39,40]</sup>

The common theme in post-EMDR therapy findings research is that it emphasizes the possibility of profound and successful clinical change. It also implies that mental problems are actually caused by physiologically stored, unprocessed memories. Therefore, it is thought that a structured treatment process will help to lessen the stigma associated with the diagnosis.

Nonetheless, the current study has several limitations. The first is that the data from the study are limited to the sample of Yahya Kemal Beyatlı Anatolian High School in Ankara, while the second is that the generalization of the data obtained is limited to 11<sup>th</sup>-grade students and the examination of the effectiveness of the EMDR treatment is limited to its application for test anxiety.

In conclusion, after considering all of the findings and observations, it is believed that EMDR therapy is an effective method for

reducing test anxiety in young people. A study area where the effectiveness of the EMDR therapy will be shown according to the exam type and level of exam anxiety will be useful in current information to the index. In addition to exam anxiety, it will be a significant factor in the method's effectiveness.

**Ethics Committee Approval:** The study protocol was approved by the Near East University, Faculty of Medicine Ethics Committee (date/no: 02.04.2022, YDÜ/SB/2022/128). The study was conducted in accordance with the principles of the Declaration of Helsinki.

**Patient Consent for Publication:** All participants and parents were informed about the nature of the study and written informed consent was obtained.

**Data Sharing Statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

**Author Contributions:** Collected the data and corresponding writer: B.G.; Collected the data: D.I.; Performed statistical analysis: T.D.E., O.E.

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