

Eye Movement Desensitization and Reprocessing (EMDR) for Anxiety and Depressive Disorders in Children and Adolescents: A Review of the available Literature

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Introduction: Eye movement desensitization and reprocessing (EMDR) has abundant evidence of efficacy in traumatic spectrum disorders. Its efficacy in anxiety disorders (AD) and depressive disorders (DD) in children and adolescents has been scarcely studied. **Methods:** We conducted a narrative review to describe the available evidence on the efficacy of EMDR in AD and DD in children and adolescents. We searched for articles available in PubMed/Medline, SciELO, PsycInfo and the Cochrane Library. All primary and secondary studies evaluating EMDR effect on AD and DD in children and adolescents were included. Their references were reviewed as a second inclusion method. **Results:** nine studies were identified (five in AD and four in DD); three were observational and six experimental. All had small sample sizes. In AD, studies corroborated the efficacy of EMDR on phobic fear in spider phobia, but not on avoidance behavior, where in vivo exposure would be superior. Two case series reported the efficacy of EMDR in choking phobia and AD associated with epilepsy. In DD, EMDR was effective in reducing depressive symptomatology in the context of major depressive disorder, acute stress disorder, and conduct disorders. EMDR was comparable to cognitive behavioral therapy. **Conclusions:** The evidence corroborates the efficacy of EMDR in AD and DD in children and adolescents. However, it is very scarce and has methodological limitations. It is necessary to carry out experimental studies with standardized and specialized EMDR protocols for AD and DD in the child and adolescent population.

Keywords: eye movement desensitization reprocessing, anxiety disorders, depressive disorder, child, adolescent

INTRODUCTION

Anxiety disorders (AD) and depressive disorders (DD) are highly prevalent in children & youth population⁽¹⁾. Among the most

studied psychotherapeutic approaches are cognitive-behavioral therapies⁽²⁾, systemic therapy⁽³⁾ and psychodynamic approach therapies⁽⁴⁾. Likewise, the therapeutical approach of eye movement desensitization and reprocessing

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(EMDR) has proven to be effective for treating multiple nosological groups. Among them AD & DD are included⁽⁶⁾. However, its development in LatAm is just starting compared with classic approaches.

EMDR was developed since 1987 by the Francine Shapiro's Group. It was mainly applied in post-traumatic stress disorders⁽⁶⁾ observed in sexual abuse victims and Veterans. However, since then evidence has been gathered in favor of its use in patients with disorders out of trauma spectrum. Therefore, it has been included as an effective intervention in several Clinical Practice Manuals for treating various mental health conditions in many countries around the world⁽⁷⁾.

Various neurobiological effect mechanisms for EMDR have been outlined^(8,9). Symptoms related with traumatic experiences have been reported to be caused by a faulty processing of stressing memories by various brain areas involved in processing emotions, memories, self-perception and attention, during the rapid eye movement (REM)⁽¹⁰⁾ stage while sleeping. Bilateral stimulation that occurs during EMDR sessions could improve processing of traumatic memories, as it changes brain functional connectivity⁽¹¹⁾, thus leading to physiological changes similar to those observed during REM sleep⁽¹²⁾ or the slow wave sleep⁽¹³⁾. Based on an animal model, Baek et.al.⁽¹⁴⁾ suggested that alternating bilateral sensory stimulation proves to have a reducing fear effect by deleting the activity of neural circuitries associated to coding fear and stabilization of inhibitory neurotransmission in a circuit, including the superior colliculus, the amygdala and the dorsomedial thalamus, whose final result would be a mitigation of traumatic memories. On the other hand, some electroencephalographic findings have reported that repetitive eye movement generates waves with theta hippocampal frequencies, thus interfering the paths connecting the frontal lobe with the hypothalamus. This is similar to what happens during the sleep REM stage. This would be associated to a restored balance of excitatory and inhibitory signals⁽¹⁵⁾.

This review is aimed to summarize and discuss findings of the studies evaluating EMDR effectiveness in AD and DD in children & youth population.

METHODOLOGY

A narrative review was made for describing evidence available on EMDR effectiveness in AD and DD in boys, girls and adolescents. A systematic search of the literature available in PubMed/Medline, SciELO, PsycInfo and Cochrane Library was made. Search terms of controlled language were looked up as follows: "child", "adolescent", "anxiety", "anxiety disorders", "affection", "depression", "depressive disorder", "phobic disorders", "EMDR" and "eye movement desensitization and reprocessing". Terms of non controlled language were used, such as "internalizing disorders". All primary articles found (any methodological design) and secondary articles (systematic reviews with or without meta-analysis) which in their title and/or in their abstract discussed about EMDR use in AD or DD in boys, girls or adolescents were included. References of articles included as a second inclusion method were reviewed. Due to the lack of research in the topics, the year of publication was not deemed as an exclusion criterion, but we did exclude articles written in Asian languages.

RESULTS

Nine studies, since 1997 to 2019 were included: three observational studies (one case report and two cases series) and six experimental studies (two quasi-experimental studies and four randomized clinical trials). Systematic literature reviews were not found. Next, we summarized the evidence found, according to the clinical pictures reported in literature about children & youth population.

Table 1 describes the studies included in this review.

Anxiety Disorders

Specific Phobias

Specific phobias have a high prevalence in general population, therefore its presence has been normalized and its care is usually late (16). These disorders share various characteristics with post-traumatic stress disorder, such as, triggering a phobic reaction before an event, object or even threatening cognition (17). In specific phobias, EMDR acts desensitizing the

Table 1. Summary of the studies included in the review

| Study | Methodological Design | Objective | Country | Number of participants | Intervention Description | Results |
|---------------------------|--|--|-------------|--------------------------|---|---|
| Anxiety Disorders | | | | | | |
| Jong et.al. 1997 (20) | Quasi-experimental study before/after (experimental) | Evaluate EMDR effectiveness and <i>in vivo</i> exposure for arachnophobia treatment. | Netherlands | 22 girls | 22 girls suffering arachnophobia were treated with EMDR. This group was compared with the non-phobic control group | EMDR reduced nausea/fear sensations, but not avoidance behavior. |
| Muris et.al. 1997 (19) | Crossover Randomized Clinical Trial (experimental) | Evaluate EMDR effectiveness versus <i>in vivo</i> exposure on arachnophobia. | Netherlands | 22 girls | Half of the group was EMDR treated. The other half was treated with <i>in vivo</i> exposure. After that interventions were exchanged. | Both therapies are effective for treating self-reported symptoms. The <i>in vivo</i> had better results for reducing avoidance behavior. |
| Muris et.al. 1998 (18) | Parallel Randomized Clinical Test (experimental) | Evaluate EMDR effectiveness versus <i>in vivo</i> exposure and computerized exposure on arachnophobia. | Netherlands | 26 girls and adolescents | Some participants were EMDR/ <i>in vivo</i> exposure/ computerized treated. After that, all of them were <i>in vivo</i> exposure treated. | EMDR and <i>in vivo</i> exposure were effective in self-reported symptoms. <i>In vivo</i> exposure was had better results in reducing avoidance behavior. |
| Roos et.al. 2008 (16) | Cases series (observational) | Evaluate EMDR effectiveness in phagophobia. | Netherlands | 4 | EMDR was applied in three boys and one adolescent with phagophobia. | Clinical improvements, after one or two sessions. |
| Dautovic et.al. 2016 (21) | Cases series (observational) | Evaluate EMDR effectiveness in epilepsy with AD or intercurrent post-traumatic stress disorder. | Netherlands | 5 | All children and adolescents were EMDR treated. | All participants reported a reduction of anxiety symptomatology. |

| Depressive Disorders | | | | | | |
|--------------------------|--|--|-------------|----|---|---|
| Bae et.al. 2008 (22) | Case Reports (observational) | Evaluate EMDR effectiveness in adolescents with MDD. | South Korea | 2 | EMDR was applied in two adolescents with moderate and severe MDD | Full remission of the disorder |
| Wanders et.al. 2008 (23) | Parallel Randomized Clinical Test (experimental) | Compare EMDR effectiveness versus Cognitive-Behavioral therapy, in adolescents with behavior disorders; depressive symptomatology was measured as a secondary factor. | Netherlands | 26 | Adolescents were randomly EMDR treated, or treated with cognitive-behavioral therapy. | Both therapies were effective in behavior disorders. None was effective in depressive symptoms. |
| Roos et.al. 2011 (24) | Parallel Randomized Clinical Test (experimental) | Compare effectiveness of cognitive-behavioral therapy versus EMDR in boys with acute stress disorder exposed to disasters; depressive symptomatology was measured as a second factor | Netherlands | 52 | Boys were randomly EMDR treated or treated with cognitive-behavioral therapy | Both therapies were effective for treating depressive symptoms; there were no differences among them. |
| Paauw et.al. 2019 (5) | Before/After Quasi-Experimental Study (experimental) | Test EMDR effectiveness for MDD treatment | Netherlands | 23 | Boys were EMDR treated, but with no control group. | 60% MDD remission. |

first experience that caused the phobia, the most painful experience and the last experience. Additionally, it helps to face avoidance behavior of the patient, thus - by means of imagery- reenacting a future event associated to a more functional cognition (16).

Four studies in specific phobias were found (16,18–20). Three of them were found in arachnophobias (18–20); and one in phagophobia (16). From the three studies on arachnophobia, one of them was a randomized clinical test with parallel groups (18); another one was a crossover randomized clinical trial (19) and the last one was a non randomized clinical test (20).

In the first study made on arachnophobia, Jong et.al. (20) researched EMDR effectiveness in 22 girls, who were subject to EMDR and exposed in vivo. The research reported a reduction of fear and nausea sensations evoked with the therapy. As an additional finding, girls who suffered phobia were reported to have a higher sensitivity to nausea. These patients reported these characteristics from early childhood and their parents suffered higher sensitivity to nausea as well. Therefore, the theory is that it is a hereditary factor to a response learned from the origin of this condition.

The second study was made by Muris et.al. (19). 22 girls were recruited (they were 11 years old, as an average) who suffered arachnophobia. They were exposed to one EMDR session and one in vivo exposure session in a crossed manner (i.e. half of the girls were first EMDR treated; then they were concomitantly exposed in vivo, while the other half was under treatment in a reverse order). The results reported that EMDR had positive and significant effects on phobias; however, in vivo exposure had a higher reduction of avoidance behavior.

The third study was made by Muris et.al. (18). 26 girls and adolescents, aged between 8 to 17 years old participated. These patients were subject to EMDR randomized, in vivo exposed and computing exposed. In the second stage, all participants were subject to an in vivo exposure session. All the results were measured at the beginning, after the first and the second stage, thus confirming that in vivo exposure caused significant improvement in all of them, including avoidance behavior. EMDR only had effect in self-reported arachnophobia. Along

with this, no evidence was obtained aimed to point out some benefit from EMDR as an in vivo exposure enhancer.

The fourth study on phobias deals with one series of three boys and one adolescent with phagophobia (3, 4, 7 and 15 years old), made by Roos et.al. (16). All of them reported a quick clinical improvement, after one or two sessions. Normalization of feeding patterns, ponderal increase and higher positive affection were reported.

Anxiety Disorders associated to another Medical Condition

Finally, a case series were found. Dautovic et.al. (21) published a research on EMDR clinical results for treating children and adolescents with epilepsy in comorbidity to AD or post-traumatic stress disorder. Five children and adolescents, aged between 8 and 18 years old were included. EMDR reported a significant clinical improvement in anxiety symptomatology associated to disorder of generalized anxiety, specific phobias and panic disorder. This improvement remained during the year of follow up. Among adverse effects associated to EMDR tiredness and drowsiness were reported.

No studies regarding other types of anxiety disorders were found.

Depressive Disorders

Our search found four studies evaluating EMDR effectiveness in boys or adolescents with DD or depressive symptoms. Two of them measured EMDR effect in major depressive disorder (MDD) (one report of two cases (22) and a quasi-experimental before/after study (5)). Both of them were made in adolescent population. The two other studies measured EMDR effects on depressive symptoms associated to another psychiatric condition (23,24).

Bae et.al. (22) reported two cases of adolescents aged between 16 to 14 years old with Moderate and severe MDD, respectively. These were measured by means of the Hamilton Depression Rating Scale (HDRS). Vital stressing events which could influence on MDD progression were identified. After three and seven EMDR sessions, in each case, both patients could get full MDD remission, which remained during a three-month follow up.

In the quasi-experimental study published by Paauw et.al. (5), the objective was to prove EMDR effectiveness and security as an MDD treatment in adolescents. From the 32 participants, 73% of them had experienced a stressing vital event which could have been related with the pathology onset (they did not meet the A criterion of post-traumatic stress disorder). Six EMDR sessions per week were held. After this, 60.9% of the adolescents did not comply with MDD diagnosis criteria any more. This additionally caused a reduction in the symptomatology related with trauma, anxiety, somatic complaints and improvement of social/emotional functioning. No adverse events were reported. By using a statistical regression model, severity of trauma symptomatology was reported to significantly predict EMDR effectiveness on MDD.

Regarding the two studies measuring reduction of depressive symptoms in the context of other mental health pathologies, the first of them, made by Wanders et.al. (23), compared EMDR effectiveness with cognitive-behavioral therapy for managing children with behavioral disorders. 26 children were randomized, 14 of them received EMDR and 12 of them received the other therapy. Both groups had four sessions. None of the groups reported a significant reduction of depressive symptomatology. In the second study, made by Roos et.al. (24) effectiveness of the same interventions in children and adolescents exposed to an environmental disaster were analyzed. 52 children and adolescents -along with their parents- were randomized and treated. The conclusion was that both interventions were effective to reduce depressive symptoms. No differences were reported among them. However, symptomatic relief was quickly achieved with EMDR.

DISCUSSION

This review included nine studies meeting the defined criteria. All of them, except one, were made in the Netherlands. Even though very few studies were found, focused on analyzing clinical EMDR effectiveness in AD and DD, in children and adolescents, the findings of this review report that, both, at observational design level as at an experimental level, the interven-

tion reports significant and comparable results similar to those of most studied therapies, such as cognitive-behavioral therapy and in vivo exposure. However, the evidence found is based on studies having various methodological constraints.

The evidence comes from observational studies, such as case series or experimental studies which did not have a randomization process, or else if they had it, its sample size was small. This hinders results extrapolation to the population the sample comes from. Likewise, there are differences among the compared interventions, as EMDR sessions had various durations and frequencies. Likewise, three of the nine studies included had to do with an observational design, which limits the possibility to properly study a therapeutical intervention.

On the other hand, psychometric scales measuring depression and anxiety are just a few in children & youth population. In fact, some studies -included in this review- applied scales for adult population in an adolescent group. Apart from the aforementioned, we could say that constructs such as depression and anxiety, evaluated by these instruments include symptomatological traits of traumatic issues. This would explain why EMDR is effective in the patients studied. This aspect is controversial, as it is possible to say that EMDR treats traumatic events potentially underlying AD or DD and it does not directly treat anxiety or depression. But, the separation between traumatic events and anxious and depressive experiences is not realistic, as the research recognizes a significant environmental component in AD and DD in children and adolescents. Vital stressing events have a key role in the onset and maintenance of these symptoms (25–28). Under this scenario, a generalized EMDR effect in adult population has been expressed. We believe this would be extrapolatable to children & youth population. This is because, when traumatic memories -associated to specific negative cognitions- are treated, negative cognitions that were not treated directly were deleted as well. In turn, these negative cognitions are unspecific for specific disorders; therefore, its intervention would benefit many disorders which share cognitions and negative affection (29).

Regarding AD, literature report a higher

EMDR effect on self-reported fear than on avoidance behavior, which is a key aspect in phobic disorders. Therefore, its effectiveness in specific phobias must be further studied. Regarding the aforementioned, low-anxiety patients have been reported to get more benefits from the in vivo exposure. On the other hand, highly anxious patients or those who had a traumatic background, EMDR would be a better alternative (17). This could explain the positive result found in Roos et.al. (16) EMDR study on phagophobia. This type of phobia has a traumatic component associated to disorder onset (for instance, an asphyxia event (16)). However, in arachnophobia, the quoted studies did not prove EMDR is better than in vivo exposure therapy.

Evidence of EMDR effectiveness in DD in children & youth population is even more scarce. There are no EMDR studies on MDD in infant non-adolescent population. Regarding research in adolescents, the main constraints deal with their non-controlled observational/experimental designs, their short follow up periods and the diversity of diagnosis instruments. In a randomized clinical test, made by Koll et.al. (30) on adult population suffering post-traumatic stress disorder, the authors compared effectiveness of Fluoxetine versus EMDR plus placebo. The group assigned to EMDR got a significantly lower depression score than the group assigned to Fluoxetine. Researchers proposed that once the trauma is over, other psychological functioning domains seem to improve in a background scenario.

Our suggestion is to implement EMDR Protocols aimed to more specifically address anxiety/depression symptomatology in boys, girls and adolescents. Despite the scarce evidence, the results of this treatment -both at a basic level and at a clinical level, and especially in adult population- are promissory, as it has a robust theoretical base. It is necessary that future studies regarding EMDR effectiveness in AD and DD include randomized clinical trials with bigger samples and better bias control. Further investigations should also analyze the application of this treatment in other AD, where a favorable result should be expected, as in the anxiety disorder, due to parents split.

EMDR is a safe intervention. It has robust evidence, and its application Area encompass

beyond psychic trauma. Apart from that, currently it is possible to be used with telemedicine as it has become prominent these days.

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