REVIEW ARTICLE

The Role of Eye Movement Desensitization and Reprocessing (EMDR) Therapy in Medicine: Addressing the Psychological and Physical Symptoms Stemming from Adverse Life Experiences

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Abstract

Background: A substantial body of research shows that adverse life experiences contribute to both psychological and biomedical pathology. Eye movement desensitization and reprocessing (EMDR) therapy is an empirically validated treatment for trauma, including such negative life experiences as commonly present in medical practice. The positive therapeutic outcomes rapidly achieved without homework or detailed description of the disturbing event offer the medical community an efficient treatment approach with a wide range of applications.

Methods: All randomized studies and significant clinical reports related to EMDR therapy for treating the experiential basis of both psychological and somatic disorders are reviewed. Also reviewed are the recent studies evaluating the eye movement component of the therapy, which has been posited to contribute to the rapid improvement attributable to EMDR treatment.

Results: Twenty-four randomized controlled trials support the positive effects of EMDR therapy in the treatment of emotional trauma and other adverse life experiences relevant to clinical practice. Seven of 10 studies reported EMDR therapy to be more rapid and/or more effective than trauma-focused cognitive behavioral therapy. Twelve randomized studies of the eye movement component noted rapid decreases in negative emotions and/or vividness of disturbing images, with an additional 8 reporting a variety of other memory effects. Numerous other evaluations document that EMDR therapy provides relief from a variety of somatic complaints.

Conclusion: EMDR therapy provides physicians and other clinicians with an efficient approach to address psychological and physiologic symptoms stemming from adverse life experiences. Clinicians should therefore evaluate patients for experiential contributors to clinical manifestations.

Introduction

Eye movement desensitization and reprocessing (EMDR)[1] is an empirically validated psychotherapy approach that medical personnel can employ to treat the sequelae of psychological trauma and other negative life experiences. Its ability to rapidly treat unprocessed memories of these adverse experiences has important implications for the medical community, as they appear to be the foundation for an array of clinical symptoms. Clinical applications of EMDR include a wide variety of psychological problems affecting patients and family members, as well as stress-induced physical disorders and medically unexplained symptoms. The frequent ability of EMDR to bring about substantial improvement in short periods of time has relevance to major current problems in medical practice such as increasing patient load and the cost of medical care. The therapy procedures can be used by qualified medical personnel to improve comfort levels and functionality in managing some of their most difficult cases in everyday practice.

EMDR therapy was introduced in 1989 with the publication of a randomized controlled trial (RCT)[2] evaluating its effects with trauma victims. The same year, the first RCTs on trauma-focused cognitive behavioral therapy (CBT) and psychodynamic therapy were published.[3,4] In 2008, an Institute of Medicine report[5] stated that more research was needed to determine the efficacy of EMDR, cognitive therapy, and pharmacotherapy in the treatment of posttraumatic stress disorder (PTSD); psychodynamic therapy and hypnotherapy were not considered because of the paucity of relevant evidence (one study each). However, since that time additional EMDR therapy RCTs with PTSD participants have been published, and this therapy is recommended as an effective treatment for trauma victims by numerous organizations, including the American Psychiatric Association,[6] Department of Defense,[7] and World Health Organization.[8] Although meta-analyses report comparable effect sizes for CBT and EMDR therapy[9,10] and both are considered "highly efficacious in reducing PTSD symptoms,"[10p225] there are significant differences between the two treatments. As noted in the World Health Organization's 2013 *Guidelines for the Management of Conditions That Are Specifically Related to Stress,*[8] whereas both therapies are recommended for PTSD treatment in children, adolescents, and adults, "Like CBT with a trauma focus, EMDR therapy aims to reduce subjective distress and strengthen adaptive cognitions related to the traumatic event. Unlike CBT with a trauma focus, EMDR does not involve a) detailed descriptions of the event, b) direct challenging of beliefs, c) extended exposure, or d) homework."[8p1]

Twenty-nine RCTs have evaluated EMDR therapy as a trauma treatment. Excluding 4 RCTs determined by the International Society for Traumatic Stress Practice Guidelines Taskforce[11] to

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have provided insufficient treatment doses, fidelity, or both, the remaining 25 studies have created a strong knowledge base. Twenty-four RCTs support the use of EMDR therapy with a wide range of trauma populations (see meta-analyses cited above for a comprehensive listing of most studies and critiques). Seven of 10 RCTs have indicated that EMDR therapy is more rapid or otherwise superior to CBT,[12-19] and only 1 has reported superior effects for CBT on some measures.[20] The latter is likewise the only RCT (of 25) to report a control condition superior to EMDR. Whereas the EMDR therapy involved only 8 standard sessions and no homework, the CBT treatment was vastly more complex and entailed 4 sessions of imaginal exposure (describing the trauma) and 4 sessions of therapist-assisted in vivo exposure (physically going to a disturbing location) plus approximately 50 hours of combined imaginal exposure and in vivo exposure homework. The EMDR therapy condition involved only 8 standard sessions and no homework. Of particular note with respect to general clinical practice is a study conducted at Kaiser Permanente[21,22] that reported that 100% of single-trauma victims and 77% of multiple-trauma victims no longer had PTSD after a mean of six 50-minute EMDR therapy sessions, demonstrating a large and significant pretreatment versus posttreatment effect size (Cohen's $\delta = 1.74$). This is consistent with 2 other RCTs that found that 84% to 90% of single-trauma victims no longer had PTSD after three 90-minute EMDR sessions.[23-25] Most recently, a study funded by the National Institute of Mental Health evaluated the effects of 8 sessions of EMDR therapy compared to 8 weeks of treatment with fluoxetine.[26] EMDR was superior for the amelioration of both PTSD symptoms and depression. Upon termination of therapy, the EMDR group continued to improve, whereas the fluoxetine participants who had reported as asymptomatic at posttest again became symptomatic. At follow-up, 91% of the EMDR group no longer had PTSD, compared with 72% in the fluoxetine group.

EMDR therapy is an eight-phase treatment approach composed of standardized protocols and procedures. The eight phases and three-pronged protocol facilitate a comprehensive evaluation of the clinical picture, client preparation, and processing of a) past events that set the foundation for pathology, b) current disturbing situations, and c) future challenges (Table 1).[27]

One of the components used during the reprocessing phases is composed of dual attention stimuli in the form of bilateral eye movements, taps, or tones. The eye movements have been the subject of great scrutiny and were called into question a decade ago by a meta-analysis[28] of studies evaluating treatment effects with and without this component. However, guidelines published by the International Society for Traumatic Stress Studies[11] indicated that no conclusions were possible because the studies evaluated in the meta-analyses were fatally flawed owing to the use of inappropriate populations, insufficient treatment doses, and lack of power. In contrast, since that time, 20 RCTs have indicated positive effects of the eye movement component. Twelve RCTs demonstrate an immediate decrease in arousal, negative emotions, and/or imagery vividness,[29,30] and the remainder report additional memory effects, including increased attentional flexibility,[31] memory retrieval,[32] and recognition of true information.[33] A recent meta-analysis[34] has reported that significant outcomes are evident in both clinical studies, with a moderate effect size (Cohen's $\delta = 0.41$), and laboratory experiments, with a large effect size (Cohen's $\delta = 0.74$). Three dominant hypotheses regarding proposed mechanisms of action

Table 1. Overview of eight-phase eye movement desensitization and reprocessing (EMDR) therapy treatment[27]

Phase	Purpose	Procedures
History taking	Obtain background information Identify suitability for EMDR treatment Identify processing targets from events in client's life according to standardized three-pronged protocol	Standard history-taking questionnaires and diagnostic psychometrics Review of selection criteria Questions and techniques to identify 1) past events that have laid the groundwork for the pathology, 2) current triggers, and 3) future needs
Preparation	Prepare appropriate clients for EMDR processing of targets	Education regarding the symptom picture Metaphors and techniques that foster stabilization and a sense of personal control
Assessment	Access the target for EMDR processing by stimulating primary aspects of the memory	Elicit the image, negative belief currently held, desired positive belief, current emotion, and physical sensation and baseline measures
Desensitization	Process experiences toward an adaptive resolution (no distress)	Standardized protocols incorporating eye movements (taps or tones) that allow the spontaneous emergence of insights, emotions, physical sensations, and other memories
Installation	Increase connections to positive cognitive networks	Enhance the validity of the desired positive belief and fully integrate the positive effects within the memory network
Body Scan	Complete processing of any residual disturbance associated with the target	Concentration on and processing of any residual physical sensations
Closure	Ensure client stability at the completion of an EMDR session and between sessions	Use of guided imagery or self-control techniques if needed Briefing regarding expectations and behavioral reports between sessions
Reassessment	Ensure maintenance of therapeutic outcomes and stability of client	Evaluation of treatment effects Evaluation of integration within larger social system

of EMDR therapy that have been supported by research[35-37] include that the eye movements a) tax working memory, b) elicit an orienting response, and c) link into the same processes that occur during rapid eye movement sleep.

Experiential Contributors to Pathology

EMDR therapy is guided by the adaptive information processing (AIP) model. Developed in the early 1990s,[1] this concept posits that, except for symptoms caused by organic deficits, toxicity, or injury, the primary foundations of mental health disorders are unprocessed memories of earlier life experiences. It appears that the high level of arousal engendered by distressing life events causes them to be stored in memory with the original emotions, physical sensations, and beliefs. The flashbacks, nightmares, and intrusive thoughts of PTSD are prime examples of symptoms resulting from the triggering of these memories. However, as indicated in the AIP model, a wide range of adverse life experiences can also be stored in a dysfunctional manner, providing the basis for diverse symptomology that include negative affective, cognitive, and somatic responses. Sufficient processing of those accessed memories within the standard three-pronged EMDR therapy protocol brings about adaptive resolution and functioning. It is conjectured that processing the targeted experiences transfers them from implicit and episodic memory to explicit and semantic memory systems.[1,38] The originally experienced negative emotions, physical sensations, and beliefs are altered as the targeted memory is integrated with more adaptive information. What is useful is learned and stored with appropriate affective, somatic, and cognitive concomitants. Consequently, the disturbing life experience becomes a source of strength and resilience.[39]

Support for the AIP tenets positing the primacy of life experiences to pathology comes from research showing that general life experiences (eg, relational problems, problems with study or work) can be the source of even more posttraumatic stress symptoms than major trauma.[40] Hence, patients presenting with anxiety, depression, hypervigilance, frequent anger, etc, should be evaluated for adverse experiences contributing to current dysfunction. Two RCTs have demonstrated the effectiveness of EMDR therapy in treating distressing life experiences that do not meet the criteria for traumatic events in the diagnosis of PTSD.[24,25,41] Both trials reported positive treatment effects within 3 sessions. One of the studies using a mixed sample[24,25] reported comparable decreases in symptoms whether or not the participant met all criteria for PTSD. The 3 sessions of EMDR therapy resulted in an 84% remission of PTSD diagnosis with a large and significant pretreatment versus posttreatment effect size (Cohen's $\delta = 1.69$).

The ability of EMDR therapy to rapidly treat unprocessed memories of distressing life experiences has multiple applications in medical practice, as such memories have been identified as the basis for a wide variety of clinical symptoms. Research has revealed widespread mental health treatment implications. For instance, "Harsh physical punishment [ie, pushing, grabbing, shoving, slapping, hitting] in the absence of [more severe] child maltreatment is associated with mood disorders, anxiety disorders, substance abuse/dependence, and personality disorders in a general population sample."[42p1] Additional research demonstrates that "Exposure to adverse, stressful events … has been linked to socioemotional behavior problems and cognitive deficits."[43p270] These studies highlight the significance of carefully evaluating patients for a history of adverse life experiences. It is particularly important in the treatment of children to identify interpersonal experiences, including household dysfunction, bullying, and humiliation, that may be contributing to problems such as anxiety, lack of focus, angry outbursts, inattention, and impulsivity issues that might otherwise be incorrectly diagnosed as attention deficit hyperactivity disorder.[44,45] A course of EMDR therapy treatment can be used to alleviate the effects of experiential contributors and to evaluate whether or not medication is actually needed. Reports of insomnia, nightmares, and night terrors should be similarly evaluated, as memory processing alone can improve the quality of sleep.[46]

Although these studies have contributed greatly to our knowledge base, the most important research underscoring the importance of experiential contributors to both physical and mental health problems is the Adverse Childhood Experiences (ACE) Study.[47] This study examined more than 17,000 adult members in the Kaiser Permanente Medical Care Program and "… found a strong dose-response relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults."[47p251] The implications for combined medical and psychological treatment are relevant to both prevention and remediation. In this regard, the use of EMDR therapy to treat the patient and to identify the adverse life experiences that contribute to current symptoms, and processing the memories to an adaptive resolution, can significantly contribute to efficient clinical practice.[1,48,49]

EMDR Therapy Approach

According to the AIP model, current experiences link into already established memory networks and can trigger the unprocessed emotions, physical sensations, and beliefs inherent in earlier-stored adverse life experiences. In this way, when the past becomes present and patients react in a dysfunctional manner, it is because their perceptions of current situations are colored by their unprocessed memories. The AIP conceptualization provides the basis for a comprehensive evaluation of the clinical picture, the targets selected for treatment, and the procedures used during reprocessing.[1,45,49,50] Unlike CBT, which involves extended focused attention on the disturbing event, EMDR reprocessing sessions promote an associative process that clearly reveals the intricate connections of memories that are triggered by current life experiences. The transcript of a patient who requested treatment for PTSD following an earthquake[48] reveals the experiences of household dysfunction that set the foundation for her current symptoms (see Sidebar: Partial Transcript of EMDR Therapy Session, available online at: www.thepermanentejournal.org/files/Winter2014/EyeMovement.pdf). Note the spontaneous emergence of insight that ties together both past and present trauma, as well as the rapid change in affect and cognitive response. Also of note is the recognition of childhood feelings of powerlessness that provide the foundation for psychosomatic problems. Such rapid decline in subjective distress during a single EMDR therapy session has been reported in a number of

RCTs.[14,51,52] A short course of EMDR therapy has also been found to successfully treat cases of perceived neuropathy[48] as well as stress-related dermatologic disorders such as atopic dermatitis, psoriasis, acne excoriee, and generalized urticaria.[53]

Importantly, while CBT trauma treatments involve one to two hours of daily homework to achieve positive effects, EMDR therapy uses none. As reported in a controlled study funded by the National Institute of Mental Health, "An interesting potential clinical implication is that EMDR seemed to do equally well in the main despite less exposure [to the trauma memory] and no homework."[54p614] Rapidly attained treatment effects and the absence of homework make EMDR therapy highly amenable to physical rehabilitation services. An RCT with patients suffering from PTSD following a life-threatening cardiovascular event compared eight sessions of EMDR therapy to imaginal exposure therapy (which involves concentrating on the trauma memory and repeatedly describing it in detail).[12] EMDR therapy resulted in greater reductions on all measures posttest, indicating a rapid decline in trauma symptoms, depression, and anxiety. Of note, significant improvement in trait anxiety was also reported and maintained. No such improvement was reported for imaginal exposure therapy. The authors reported that EMDR therapy was initially posited to be more "gentle" and therefore amenable for this debilitated population because "distancing" rather than reliving has been found to be correlated with treatment effects,[55] and the eye movements used in EMDR appear to immediately cause parasympathetic activation, resulting in physiologic calming.[34,56,57] Further, RCTs of initial treatment sessions indicate that the subjective distress of patients decreases with EMDR therapy, whereas it increases with exposure therapy.[14,52]

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Rehabilitation services can benefit from EMDR therapy to support both patient and family members. The traumatic impact of dealing with life-threatening, incapacitating disease can be mitigated by incorporating relatively few memory-processing sessions to address distressing medical experiences, current situations, and fears of the future. As reported by Gattinara,[58p170-1]

> "Using this approach in the field of neuromuscular disease is useful on three levels:
>
> 1. It can facilitate the processing of the traumatic event in the patient and the whole family.
> 2. It can rapidly reestablish a secure interpersonal context between the patient and his or her caregiver by reducing the high arousal level.
> 3. It can transform the health service into a network of support for patient and family, offering help in managing the emotional vulnerability connected with physical vulnerability, thus buffering the adverse impact of worsening clinical conditions."

In addition, because EMDR therapy requires no homework, it can be used on consecutive days, allowing rapid completion of treatment. The cost implications are obvious.

EMDR therapy can also be used to help support family members dealing with the death of a loved one. The results of both prolonged debilitation and sudden death can involve trauma symptoms that include distressing intrusive images of the suffering patient. The family member is often unable to retrieve positive memories of the deceased, which further exacerbates and complicates the grieving process.[59] As indicated in a nonrandomized multisite study,[60] EMDR therapy reduced symptoms significantly more rapidly than the CBT on behavioral measures and on 4 of 5 psychosocial measures. EMDR was more efficient, inducing change at an earlier stage and requiring fewer sessions (6.2 vs 10.7 sessions). Positive recall of the deceased was significantly greater (twice the frequency) posttreatment with EMDR.

A wide range of patients suffering from debilitating medical conditions can also benefit from EMDR therapy. For instance, the utility of psychological services for burn victims has been reported, with EMDR therapy specifically recommended on the basis of both effectiveness and brevity of treatment.[61] As indicated previously, three to six sessions are generally sufficient to alleviate symptoms from a single trauma. Of particular note is the elimination of both PTSD and somatic symptoms in a burn victim who had been severely debilitated for almost a decade.[62] The rapid alleviation of the patient's symptoms and return to independent functioning are consistent with the AIP model, which posits that the feelings of helplessness and hopelessness are the result of unprocessed memories of the trauma that contain the perceptions experienced at the time of the event.[1,48,49]

These findings have important implications for the medical community in that many chronic pain patients may actually be debilitated by unprocessed memories encoded with the original somatic perceptions. As noted by Ray and Zbik,[63] whereas CBT treatments address chronic pain through cognitive interventions that can reduce distress, EMDR therapy can result in the elimination of the pain sensations. For instance, a number of researchers have reported positive outcomes of EMDR therapy for the treatment of phantom limb pain. The 4 evaluations of patients published to date[64-67] indicate an aggregate 80% success rate as defined by complete elimination or substantial reduction of pain sensations. According to the AIP model, the phantom pain is caused by the unprocessed memory of the experience during which the limb was damaged. This unprocessed memory contains the physical sensations experienced at the time of the event. EMDR processing of the memory results in a simultaneous shift in emotions, physical sensations, and beliefs.[1,49] Completed processing is posited to involve an alteration of the originally stored memory through a process of integration and reconsolidation.[1,68] The change in the targeted memory results in an elimination of those pain sensations that are not caused by physical nerve damage. Successful elimination and/or reduction of pain to tolerable levels has been reported after 2 to 9 EMDR therapy sessions. Therefore, when no neuropathy is observed in chronic pain patients it is often beneficial to explore the potential results of a short course of memory processing.[69,70] In addition, EMDR therapy has been reported to be beneficial in the treatment of migraine headaches in an open trial[71] and an RCT.[72]

Potential Neurobiologic Concomitants

The different treatment outcomes and the procedural differences between EMDR therapy and CBT indicate potentially diverse underlying neurobiologic mechanisms. For instance, trauma-focused CBT exposure therapies entail extended, detailed repetitions of the disturbing event that are repeated during both sessions and homework. Research has indicated that prolonged exposures, as used in CBT, result in extinction, whereas brief exposures as used in EMDR therapy trigger memory reconsolidation.[73] These differences have significant neurobiologic and clinical implications. As noted by Craske et al,[74p6] "… recent work on extinction and reinstatement … suggests that extinction does not eliminate or replace previous associations, but rather results in new learning that competes with the old information." This mechanism is posited to account for relapse. Further, "Extinction is conceptualized as the development of a second context-specific inhibitory association that, in contrast to fear acquisition, does not easily generalize to new contexts."[74p12] These factors may account for differences in treatment time, with EMDR therapy reported to be more rapid than CBT in five RCTs,[13-15,17-19] as well as reported positive effects obtained with EMDR treatment that have not been reported with CBT (eg, elimination of phantom limb pain, increased positive recall of the deceased). The fact that CBT exposure therapies are posited to leave the original memory intact may be the reason these beneficial results have not been reported with CBT. Likewise, a recent pilot study indicated that six sessions of EMDR therapy with patients with psychosis and PTSD also resulted in "a positive effect on auditory verbal hallucinations, delusions, anxiety symptoms, depression symptoms, and self-esteem."[75p664] By contrast, successful CBT has resulted in a continuation of auditory hallucinations that the patient experiences, but with less distress. In the EMDR study, the majority of participants who had initially experienced auditory hallucinations reported that these had disappeared. The findings that " … childhood adversity is strongly associated with increased risk for psychosis"[76p2] suggest the need for additional rigorous research evaluating the effects of memory processing with this population.

Future Research

The ACE Study[47] conducted at Kaiser Permanente provides an ideal platform for future research to evaluate the effects of EMDR therapy for a wide range of psychological and physical problems pertinent to medical practice. Some of the conditions found in the ACE Study to be correlated with exposure to adverse life experiences in childhood are alcoholism, drug abuse, severe obesity, depression, and suicide attempts. These conditions would lend themselves well to rigorous RCTs in which integrated EMDR therapy protocols that include processing the disturbing memories are compared to current standard care. Both immediate and long-term follow-up of at least a year's duration to evaluate maintenance of treatment gains would greatly inform current medical practices.

Of equal importance is the finding in the ACE Study that ACEs result in the increased incidence of physically debilitating conditions such as ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. Rigorous longitudinal studies to evaluate the utility of EMDR therapy for preventive care would provide the medical community an important opportunity to determine whether processing the memories of adverse experiences can ameliorate these detrimental effects. The social policy and financial implications of such studies underscore their importance in providing optimal care.

For any of the suggested studies, it is vital that clinical personnel with appropriate treatment fidelity carefully assess the nature of the disturbing events in the patient's history and allocate adequate treatment time to process a sufficient number of memories to potentially achieve asymptomatic status. As reported in the ACE Study,[47] there is a "strong graded relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults."[47p245] As indicated previously, a short course of EMDR therapy may be sufficient to eliminate a variety of psychological and somatic conditions. However, patients who have been serially abused throughout childhood will generally need more treatment time to achieve comprehensive adaptive resolution.[1,50] Given that EMDR treatment effects generalize to similar memories, it is unnecessary to process each disturbing event. However, sufficient time should be provided to process the relevant memories within the various categories of adverse experiences.

For all the suggested studies, the inclusion of procedures to identify epigenetic and neurophysiologic changes subsequent to treatment also opens the door to potentially important assessment possibilities. Since EMDR therapy can be provided on consecutive days, successful treatment can be accomplished over a matter of weeks, rather than months, which can reduce time confounds and provides both efficient and cost-effective research opportunities.

Conclusions

A substantial amount of research indicates that adverse life experiences may be the basis for a wide range of psychological and physiologic symptoms. EMDR therapy research has shown that processing memories of such experiences results in the rapid amelioration of negative emotions, beliefs, and physical sensations. Reports have indicated potential applications for patients with stress-related disorders, as well as those suffering from a wide range of physical conditions. The medical community can also benefit from the use of EMDR therapy for prevention and rehabilitative services to support both patients and family members. A thorough assessment of potential experiential contributors can be beneficial. If relevant, EMDR therapy can allow medical personnel to quickly determine the degree to which distressing experiences are a contributing factor and to efficiently address the problem through memory processing that can help facilitate both psychological and physical resolution. Rigorous research of the use of EMDR therapy with patients suffering from the conditions identified in the ACE Study can further contribute to our understanding of the potential for both remediation and preventive care. ❖

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References

1. Shapiro F. Eye movement desensitization and reprocessing (EMDR): basic principles, protocols and procedures. 2nd ed. New York, NY: The Guilford Press; 2001.
2. Shapiro F. Efficacy of the eye movement desensitization procedure in the treatment of traumatic memories. J Trauma Stress 1989 Apr;2(2):199-223. DOI: http://dx.doi.org/10.1007/BF00974159.
3. Keane TM, Fairbank JA, Caddell JM, Zimering RT. Implosive (flooding) therapy reduces symptoms of PTSD in Vietnam combat veterans. Behav Ther 1989 Spring;20(2):245-60. DOI: http://dx.doi.org/10.1016/S0005-7894(89)80072-3.
4. Brom D, Kleber RJ, Defares PB. Brief psychotherapy for posttraumatic stress disorders. J Consult Clin Psychol 1989 Oct;57(5):607-12. DOI: http://dx.doi.org/10.1037/0022-006X.57.5.607.
5. Institute of Medicine. Treatment of PTSD: an assessment of the evidence. Washington, DC: National Academies Press; 2007 Oct.
6. Practice guideline for the treatment of patients with acute stress disorder and posttraumatic stress disorder. Arlington, VA: American Psychiatric Association; 2004.
7. Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for management of post-traumatic stress. Washington, DC: Veterans Health Administration; 2010 Oct.
8. Guidelines for the management of conditions specifically related to stress. Geneva, Switzerland: World Health Organization; 2013.
9. Bisson J, Andrew M. Psychological treatment of post-traumatic stress disorder (PTSD). Cochrane Database Syst Rev 2007 Jul 18;(3):CD003388. DOI: http://dx.doi.org/10.1002/14651858.CD003388.pub3.
10. Bradley R, Greene J, Russ E, Dutra L, Westen D. A multidimensional meta-analysis of psychotherapy for PTSD. Am J Psychiatry 2005 Feb;162(2):214-27. DOI: http://dx.doi.org/10.1176/appi.ajp.162.2.214.
11. Chemtob CM, Tolin DF, van der Kolk BA, Pitman RK. Eye movement desensitization and reprocessing. In: Foa EB, Keane TM, Friedman MJ, Cohen JA, editors. Effective treatments for PTSD: practice guidelines from the International Society for Traumatic Stress Studies. New York, NY: The Guilford Press; 2000 Jan 1. p 139-55, 333-5.
12. Arabia E, Manca ML, Solomon RM. EMDR for survivors of life-threatening cardiac events: results of a pilot study. Journal of EMDR Practice and Research 2011;5(1):2-13. DOI: http://dx.doi.org/10.1891/1933-3196.5.1.2.
13. de Roos C, Greenwald R, den Hollander-Gijsman M, Noorthoorn E, van Buuren S, de Jongh A. A randomised comparison of cognitive behavioural therapy (CBT) and eye movement desensitisation and reprocessing (EMDR) in disaster-exposed children. Eur J Psychotraumatol 2011;2. DOI: http://dx.doi.org/10.3402/ejpt.v2i0.5694.
14. Ironson G, Freund B, Strauss JL, Williams J. Comparison of two treatments for traumatic stress: a community-based study of EMDR and prolonged exposure. J Clin Psychol 2002 Jan;58(1):113-28. DOI: http://dx.doi.org/10.1002/jclp.1132.
15. Jaberghaderi N, Greenwald R, Rubin A, Zand SO, Dolatabadi S. A comparison of CBT and EMDR for sexually-abused Iranian girls. Clin Psychol Psychother 2004 Sep/Oct;11(5):358-68. DOI: http://dx.doi.org/10.1002/cpp.395.
16. Lee C, Gavriel H, Drummond P, Richards J, Greenwald R. Treatment of PTSD: stress inoculation training with prolonged exposure compared to EMDR. J Clin Psychol 2002 Sep;58(9):1071-89. DOI: http://dx.doi.org/10.1002/jclp.10039.
17. Nijdam MJ, Gersons BP, Reitsma JB, de Jongh A, Olff M. Brief eclectic psychotherapy v eye movement desensitisation and reprocessing therapy in the treatment for post-traumatic stress disorder: randomised controlled trial. Br J Psychiatry 2012 Mar;200(3):224-31. DOI: http://dx.doi.org/10.1192/bjp.bp.111.099234.
18. Power K, McGoldrick T, Brown K, et al. A controlled comparison of eye movement desensitization and reprocessing versus exposure plus cognitive restructuring versus waiting list in the treatment of post-traumatic stress disorder. J Clin Psychol Psychother 2002 Sep/Oct;9(5):299-318. DOI: http://dx.doi.org/10.1002/cpp.341.
19. Karatzias A, Power K, McGoldrick T, et al. Predicting treatment outcome on three measures for post-traumatic stress disorder. Eur Arch Psychiatry ClinNeurosci 2007 Feb;257(1):40-6. DOI: http://dx.doi.org/10.1007/s00406-006-0682-2.
20. Taylor S, Thordarson DS, Maxfield L, Fedoroff IC, Lovell K, Ogrodniczuk J. Comparative efficacy, speed, and adverse effects of three PTSD treatments: exposure therapy, EMDR, and relaxation training. J Consult Clin Psychol 2003 Apr;71(2):330-8. DOI: http://dx.doi.org/10.1037/0022-006X.71.2.330.
21. Marcus SV, Marquis P, Sakai C. Controlled study of treatment of PTSD using EMDR in an HMO setting. Psychother 1997;34(3):307-15. DOI: http://dx.doi.org/10.1037/h0087791.
22. Marcus S, Marquis P, Sakai C. Three- and 6-month follow-up of EMDR treatment of PTSD in an HMO setting. Int J Stress Manag 2004;11(3):195-208. DOI: http://dx.doi.org/10.1037/1072-5245.11.3.195.
23. Rothbaum BO. A controlled study of eye movement desensitization and reprocessing in the treatment of posttraumatic stress disordered sexual assault victims. Bull Menninger Clin 1997 Summer;61(3):317-34.
24. Wilson SA, Becker LA, Tinker RH. Eye movement desensitization and reprocessing (EMDR) treatment for psychologically traumatized individuals. J Consult Clin Psychol 1995 Dec;63(6):928-37. DOI: http://dx.doi.org/10.1037/0022-006X.63.6.928.
25. Wilson SA, Becker LA, Tinker RH. Fifteen-month follow-up of eye movement desensitization and reprocessing (EMDR) treatment of posttraumatic stress disorder and psychological trauma. J Consult Clin Psychol 1997 Dec;65(6):1047-56. DOI: http://dx.doi.org/10.1037/0022-006X.65.6.1047.
26. van der Kolk BA, Spinazzola J, Blaustein ME, et al. A randomized clinical trial of eye movement desensitization and reprocessing (EMDR), fluoxetine, and pill placebo in the treatment of posttraumatic stress disorder: treatment effects and long-term maintenance. J Clin Psychiatry 2007 Jan;68(1):37-46. DOI: http://dx.doi.org/10.4088/JCP.v68n0105.
27. Shapiro F. EMDR therapy training manual. Watsonville, CA: EMDR Institute; 2012.
28. Davidson PR, Parker KC. Eye movement desensitization and reprocessing (EMDR): a meta-analysis. J Consult Clin Psychol 2001 Apr;69(2):305-16. DOI: http://dx.doi.org/10.1037/0022-006X.69.2.305.
29. Barrowcliff AL, Gray NS, Freeman TCA, MacCulloch MJ. Eye-movements reduce the vividness, emotional valence and electrodermal arousal associated with negative autobiographical memories. J Forens Psychiatry Psychol 2004;15(2):325-45. DOI: http://dx.doi.org/10.1080/14789940410001673042.
30. Engelhard IM, van den Hout MA, Dek EC, et al. Reducing vividness and emotional intensity of recurrent "flashforwards" by taxing working memory: an analogue study. J Anxiety Disord 2011 May;25(4):599-603. DOI: http://dx.doi.org/10.1016/j.janxdis.2011.01.009.
31. Kuiken D, Bears M, Miall D, Smith L. Eye movement desensitization reprocessing facilitates attentional orienting. Imagin Cogn Pers 2001;21(1):3-20. DOI: http://dx.doi.org/10.2190/L8JX-PGLC-B72R-KD7X.
32. Christman SD, Garvey KJ, Propper RE, Phaneuf KA. Bilateral eye movements enhance the retrieval of episodic memories. Neuropsychology 2003 Apr;17(2):221-9. DOI: http://dx.doi.org/10.1037/0894-4105.17.2.221.
33. Parker A, Buckley S, Dagnall N. Reduced misinformation effects following saccadic bilateral eye movements. Brain Cogn 2009 Feb;69(1):89-97. DOI: http://dx.doi.org/10.1016/j.bandc.2008.05.009.
34. Lee CW, Cuijpers P. A meta-analysis of the contribution of eye movements in processing emotional memories. J Behav Ther Exp Psychiatry 2013 Jun;44(2):231-9. DOI: http://dx.doi.org/10.1016/j.jbtep.2012.11.001.
35. Engelhard IM, van den Hout MA, Janssen WC, van der Beek J. Eye movements reduce vividness and emotionality of "flashforwards." Behav Res Ther 2010 May;48(5):442-7. DOI: http://dx.doi.org/10.1016/j.brat.2010.01.003.
36. Kuiken D, Chudleigh M, Racher D. Bilateral eye movements, attentional flexibility and metaphor comprehension: the substrate of REM dreaming? Dreaming 2010;20(4):227-47. DOI: http://dx.doi.org/10.1037/a0020841.
37. Schubert SJ, Lee CW, Drummond PD. The efficacy and psychophysiological correlates of dual-attention tasks in eye movement desensitization and reprocessing (EMDR). J Anxiety Disord 2011 Jan;25(1):1-11. DOI: http://dx.doi.org/10.1016/j.janxdis.2010.06.024.
38. Stickgold R. Sleep-dependent memory processing and EMDR action. Journal of EMDR Practice and Research 2008;2(4):289-99. DOI: http://dx.doi.org/10.1891/1933-3196.2.4.289.
39. Solomon R, Shapiro F. EMDR and adaptive information processing: the development of resilience and coherence. In: Gow K, Celinski MJ, editors. Individual trauma: recovering from deep wounds and exploring the potential for renewal. 1st ed. New York, NY: Nova Science Publishers; 2012 Aug 15.
40. Mol SS, Arntz A, Metsemakers JF, Dinant GJ, Vilters-van Montfort PA, Knottnerus JA. Symptoms of post-traumatic stress disorder after non-traumatic events: evidence from an open population study. Br J Psychiatry 2005 Jun;186(6):494-9. DOI: http://dx.doi.org/10.1192/bjp.186.6.494.
41. Cvetek R. EMDR treatment of distressful experiences that fail to meet the criteria for PTSD. Journal of EMDR Practice and Research 2008;2(1):2-14. DOI: http://dx.doi.org/10.1891/1933-3196.2.1.2.
42. Afifi TO, Mota NP, Dasiewicz P, MacMillan HL, Sareen J. Physical punishment and mental disorders: results from a nationally representative US sample. Pediatrics 2012 Aug;130(2):184-92. DOI: http://dx.doi.org/10.1542/peds.2011-2947.

43. Obradović J, Bush NR, Stamperdahl J, Adler NE, Boyce WT. Biological sensitivity to context: the interactive effects of stress reactivity and family adversity on socioemotional behavior and school readiness. Child Dev 2010 Jan-Feb;81(1):270-89. DOI: http://dx.doi.org/10.1111/j.1467-8624.2009.01394.x.
44. D'Andrea W, Ford J, Stolbach B, Spinazzola J, van der Kolk BA. Understanding interpersonal trauma in children: why we need a developmentally appropriate trauma diagnosis. Am J Orthopsychiatry 2012 Apr;82(2):187-200. DOI: http://dx.doi.org/10.1111/j.1939-0025.2012.01154.x.
45. Gomez AM, Shapiro F. EMDR therapy with children: journey into wholeness. Child and Family Professional 2013;15:20-30.
46. Raboni MR, Tufik S, Suchecki D. Treatment of PTSD by eye movement desensitization and reprocessing (EMDR) improves sleep quality, quality of life, and perception of stress. Ann N Y Acad Sci 2006 Jul;1071:508-13. DOI: http://dx.doi.org/10.1196/annals.1364.054.
47. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. Am J Prev Med 1998 May;14(4):245-58. DOI: http://dx.doi.org/10.1016/S0749-3797(98)00017-8.
48. Shapiro F. Getting past your past: take control of your life with self-help techniques from EMDR therapy. New York, NY: Rodale Books; 2012.
49. Shapiro F. EMDR, adaptive information processing, and case conceptualization. Journal of EMDR Practice and Research 2007;1(2):68-87. DOI: http://dx.doi.org/10.1891/1933-3196.1.2.68.
50. Shapiro F, Laliotis D. EMDR and the adaptive information processing model: integrative treatment and case conceptualization. Clin Soc Work J 2011 Jun;39(2):191-200. DOI: http://dx.doi.org/10.1007/s10615-010-0300-7.
51. Jarero I, Artigas L, Luber M. The EMDR protocol for recent critical incidents: application in a disaster mental health continuum of care context. Journal of EMDR Practice and Research 2011;5(3):82-94. DOI: http://dx.doi.org/10.1891/1933-3196.5.3.82.
52. Rogers S, Silver SM, Goss J, Obenchain J, Willis A, Whitney RL. A single session, group study of exposure and eye movement desensitization and reprocessing in treating posttraumatic stress disorder among Vietnam War veterans: preliminary data. J Anxiety Disord 1999 Jan-Apr;13(1-2):119-30. DOI: http://dx.doi.org/10.1016/S0887-6185(98)00043-7.
53. Gupta MA, Gupta AK. Use of eye movement desensitization and reprocessing (EMDR) in the treatment of dermatologic disorders. J Cutan Med Surg 2002 Sep-Oct;6(5):415-21. DOI: http://dx.doi.org/10.1007/s10227-001-0116-8.
54. Rothbaum BO, Astin MC, Marsteller F. Prolonged exposure versus eye movement desensitization and reprocessing (EMDR) for PTSD rape victims. J Trauma Stress 2005 Dec;18(6):607-16. DOI: http://dx.doi.org/10.1002/jts.20069.
55. Lee CW, Taylor G, Drummond PD. The active ingredient in EMDR: is it traditional exposure or dual focus of attention? Clin Psychol Psychother 2006 Mar-Apr;13(2):97-107. DOI: http://dx.doi.org/10.1002/cpp.479.
56. Elofsson UO, von Schèele B, Theorell T, Söndergaard HP. Physiological correlates of eye movement desensitization and reprocessing. J Anxiety Disord 2008 May;22(4):622-34. DOI: http://dx.doi.org/10.1016/j.janxdis.2007.05.012.
57. Sack M, Lempa W, Steinmetz A, Lamprecht F, Hofmann A. Alterations in autonomic tone during trauma exposure using eye movement desensitization and reprocessing (EMDR)—results of a preliminary investigation. J Anxiety Disord 2008 Oct;22(7):1264-7. DOI: http://dx.doi.org/10.1016/j.janxdis.2008.01.007.
58. Gattinara PC. Working with EMDR in chronic incapacitating diseases: the experience of a neuromuscular diseases center. Journal of EMDR Practice and Research 2009;3(3):169-77. DOI: http://dx.doi.org/10.1891/1933-3196.3.3.169.
59. Solomon RM, Rando TA. Treatment of grief and mourning through EMDR: conceptual considerations and clinical guidelines. Eur Rev Appl Psychol 2012 Oct;62(4):231-9. DOI: http://dx.doi.org/10.1016/j.erap.2012.09.002.
60. Sprang G. The use of eye movement desensitization and reprocessing (EMDR) in the treatment of traumatic stress and complicated mourning: psychological and behavioral outcomes. Res Soc Work Pract 2001 May;11(3):300-20. DOI: http://dx.doi.org/10.1177/104973150101100302.
61. Van Loey NE, Van Son MJ. Psychopathology and psychological problems in patients with burn scars: epidemiology and management. Am J Clin Dermatol 2004;4(4):245-72. DOI: http://dx.doi.org/10.2165/00128071-200304040-00004.
62. McCann DL. Post-traumatic stress disorder due to devastating burns overcome by a single session of eye movement desensitization. J Behav Ther Exp Psychiatry 1992 Dec;23(4):319-23.
63. Ray AL, Zbik A. Cognitive behavioral therapies and beyond. In: Tollison CD, Satterthwaite JR, Tollison JW, editors. Practical pain management. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2002. p 189-208.
64. de Roos C, Veenstra AC, de Jongh A, et al. Treatment of chronic phantom limb pain using a trauma-focused psychological approach. Pain Res Manag 2010 Mar-Apr;15(2):65-71.
65. Russell MC. Treating traumatic amputation-related phantom limb pain: a case study utilizing eye movement desensitization and reprocessing within the armed services. Clin Case Stud 2008 Apr;7(2):136-53. DOI: http://dx.doi.org/10.1177/1534650107306292.
66. Schneider J, Hofmann A, Rost C, Shapiro F. EMDR in the treatment of chronic phantom limb pain. Pain Med 2008 Jan-Feb;9(1):76-82. DOI: http://dx.doi.org/10.1111/j.1526-4637.2007.00299.x.
67. Wilensky M. Eye movement desensitization and reprocessing (EMDR) as a treatment for phantom limb pain. Journal of Brief Therapy 2006;5(1):31-44.
68. Solomon RM, Shapiro F. EMDR and the adaptive information processing model: potential mechanisms of change. Journal of EMDR Practice and Research 2008;2(4):315-25. DOI: http://dx.doi.org/10.1891/1933-3196.2.4.315.
69. Grant M, Threlfo C. EMDR in the treatment of chronic pain. J Clin Psychol 2002 Dec;58(12):1505-20. DOI: http://dx.doi.org/10.1002/jclp.10101.
70. Mazzola A, Calcagno ML, Goicochea MT, Pueyrredòn H, Leston J, Salvat F. EMDR in the treatment of chronic pain. Journal of EMDR Practice and Research 2009;3(2):66-79. DOI: http://dx.doi.org/10.1891/1933-3196.3.2.66.
71. Konuk E, Epözdemir H, Hacıömeroğlu Atçeken S, Aydın YE, Yurtsever A. EMDR treatment of migraine. Journal of EMDR Practice and Research 2011;5(4):166-76. DOI: http://dx.doi.org/10.1891/1933-3196.5.4.166.
72. Marcus SV. Phase 1 of integrated EMDR: an abortive treatment for migraine headaches. Journal of EMDR Practice and Research 2008;2(1):15-25. DOI: http://dx.doi.org/10.1891/1933-3196.2.1.15.
73. Suzuki A, Josselyn SA, Frankland PW, Masushige S, Silva AJ, Kida S. Memory reconsolidation and extinction have distinct temporal and biochemical signatures. J Neurosci 2004 May;24(20):4787-95. DOI: http://dx.doi.org/10.1523/JNEUROSCI.5491-03.2004.
74. Craske MG, Herman D, Vansteenwegen D, editors. Fear and learning: from basic processes to clinical implications. Washington, DC: American Psychological Association (APA); 2006.
75. van den Berg DP, van der Gaag M. Treating trauma in psychosis with EMDR: a pilot study. J Behav Ther Exp Psychiatry 2012 Mar;43(1):664-71. DOI: http://dx.doi.org/10.1016/j.jbtep.2011.09.011.
76. Varese F, Smeets F, Drukker M, et al. Childhood adversities increase the risk of psychosis: a meta-analysis of patient-control, prospective- and cross-sectional cohort studies. Schizophr Bull 2012 Jun;38(4):661-71. DOI: http://dx.doi.org/10.1093/schbul/sbs050.

Eye

For the eye altering alters all.

—*The Mental Traveller,* William Blake, 1757-1827, English poet, painter, and printmaker