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Is Eye Movement Desensitization and Reprocessing Worth it? A Pragmatic Analysis For Clinicians

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IS EYE MOVEMENT DESENSITIZATION AND REPROCESSING WORTH IT? A
PRAGMATIC ANALYSIS FOR CLINICAINS

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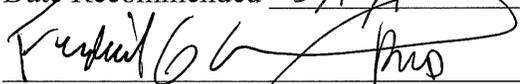Western Kentucky University
Bowling Green, Kentucky

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By
Brandon Cvengros

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IS EYE MOVEMENT DESENSITIZATION AND REPROCESSING WORTH IT? A
PRAGMATIC ANALYSIS FOR CLINICAINS

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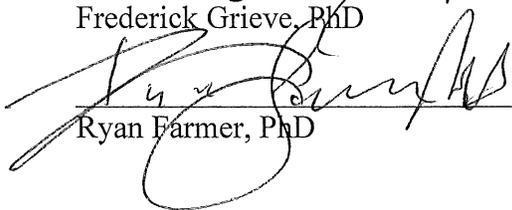
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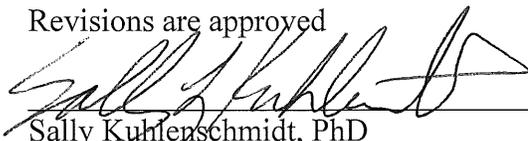
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Table of Contents

IS EYE MOVEMENT DESENSITIZATION AND REPROCESSING WORTH IT? A
PRAGMATIC ANALYSIS FOR CLINICIANS

Brandon Cvengros   February 2019   43 Pages

Directed by: Dr. Frederick Grieve and Dr. Ryan Farmer

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Eye movement desensitization and reprocessing is a treatment developed for post-traumatic

stress disorder (PTSD) that combines the cognitive processing of trauma with bilateral eye

movements (EMs). Research has demonstrated that EMDR can be an efficacious treatment for

PTSD. Other common treatments for PTSD include cognitive behavioral therapy (CBT) and

exposure therapy (ET). Research has demonstrated that both CBT and ET are efficacious in the

treatment of PTSD. EMDR is a controversial treatment, with critics stating that it is very similar

to ET and that the novel component, EMs, are irrelevant to treatment outcomes. EMDR has

additional time and financial costs, including mandatory training sessions and certification to be

allowed to administer the treatment. These factors make it difficult for a clinician to decide if

investing in EMDR is worth it. While EMDR has demonstrated that it is efficacious to use with

adults, the research on children and other populations is significantly more limited, making the

use of EMDR in such populations questionable. Research demonstrates that the role of EMs in

EMDR is poorly understood, with many competing explanations needing more investigation.

The highest quality evidence indicates that the EMs in EMDR are irrelevant to treatment

outcomes, with EMDR without any EMs performing just as well as EMDR with EMs in the

treatment of PTSD. CBT and ET do not have the additional costs of EMDR, requiring only

standard mental health provider licensing to administer. CBT and ET have more ample, higher

quality evidence for their efficacy than EMDR. CBT and ET have also demonstrated that they

are efficacious to use with children and other populations. These factors make it difficult to

recommend a clinician invest in and administer EMDR. Overall, CBT and ET can be more easily

administered and have greater evidence for their use than EMDR.

Introduction

The treatment of trauma and associated diagnoses such as post-traumatic stress disorder (PTSD), is a rapidly growing segment of mental health (Atwoli, Stein, Koenen, & McLaughlin, 2015). Eye movement desensitization and reprocessing (EMDR) is a mental health treatment developed primarily for PTSD that pairs eye movements (EMs) with the cognitive processing of trauma (Shapiro & Laliotis, 2011). Proponents of EMDR state that the movement of the eyes combined with focusing on the emotions and thoughts associated with a trauma allow the brain to process the trauma more fully, integrating all elements of it, and that this brings relief to clients (Shapiro, 2002). Initial research has shown that EMDR can be efficacious at reducing the symptoms of PTSD (Shapiro, 2002). However, EMDR has been a highly controversial treatment (Chen et al., 2014). EMDR critics (Davidson & Parker, 2001) state that the EM component of the treatment is the only aspect that differentiates it from more standard treatments for PTSD such as exposure therapy (ET). Furthermore, critics state that the EM component of EMDR does not have a significant effect on the outcome of treatment (Davidson & Parker, 2001; Jeffries & Davis, 2013; Lee & Cuijpers, 2015; Lee, Taylor & Drummond, 2006). EMDR requires that a clinician goes through a certification process before administering EMDR. This process costs clinicians both time and money that could be a significant obstacle. Thus, there is an extra financial cost and opportunity cost associated with obtaining EMDR certification. All the factors surrounding EMDR combine to make it difficult for a clinician to decide if EMDR is a treatment worth learning and administering. The purpose of this review will be to aid clinicians in deciding if EMDR is a worthwhile investment for clinicians to learn and provide to their clients.

Method

Identifying studies was done by searching the MYWKU libraries databases. Randomized Controlled Trials (RCTs) are considered excellent when evaluating treatment efficacy (Turner et al., 2003). Since determining the causal mechanisms of EMDRs effects is a primary question being explored, only RCTs are included in the analysis of EMDR and CBT. All RCT's involving the use of EMDR in the treatment of PTSD that could be found searching these databases are included in the review of EMDR. All RCT's primarily investigating the efficacy of CBT in the treatment of PTSD that could be found searching these databases were included. All studies that could be found that investigated the role of EMs in EMDR are included. Search terms included: "EMDR," "PTSD," "RCTS," "CBT," "children," "adults," "adolescents," "eye movements," "meta-analysis." All abbreviations were also spelled out for the purposes of the search. All search terms were mixed with one another to produce maximum results. Search results initially yielded over 100,000 search results. Duplicates articles, articles that were not peer reviewed, not RCTs, and not relevant to the research questions were eliminated. This yielded 3 systematic reviews, 7 meta-analyses, and 14 RCTs for review.

Results

What is EMDR?

Shapiro developed EMDR in 1989. EMDR's goal is to alleviate the pain associated with traumatic memories (Shapiro & Maxfield, 2002). EMDR accomplishes this by having clients think about the traumatic event(s) that have happened to them. Clients are asked to identify the imagery, negative beliefs, and feelings that they associate with their traumatic memories. The clinician completes this process in the initial phase of treatment, with the clinician considering the client's full trauma history. With this information, the client and the clinician develop a

treatment plan. In the second phase of treatment, clients learn stress reduction and relaxation techniques that will better equip them to handle the sessions and the time between sessions. In the third phase of treatment, actual EMDR therapy begins. Clients think about and discuss the imagery, negative beliefs, and feelings associated with their trauma while simultaneously focusing on an external stimulus with their eyes, usually a clinician's moving finger. Following the external stimuli with their eyes allows clients to engage in bilateral EMs while still focusing on their trauma. After each session, the clinician instructs clients to let their mind "go blank," and then discuss whatever thought, feeling, or image comes to mind. The clinician chooses the target or topic of the next session of stimulation based on the client's feedback. Clients repeat this process until they report having no distress associated with their traumatic memories. Clients are asked to also think of a positive belief about themselves when exposed to an upsetting trauma stimulus between sessions.

Proponents of EMDR state that this process allows the individual to access and process their traumatic experiences and bring them to a beneficial resolution (Shapiro & Laliotis, 2011) Shapiro's Adaptive Information Processing (AIP) Model states that memories that are not fully integrated into the mind can be pathogenic. The AIP model states that humans can usually fully integrate stressful experiences into their memory (Shapiro & Laliotis, 2011). However, when a particular experience is intensely stressful, or traumatic, it may be stored in a maladaptive, unprocessed form (Shapiro & Laliotis, 2011). This does not allow the memory to connect to adaptive networks within the brain that would assist in processing the experiences into a more adaptive, manageable form. Without this proper, full integration of the memory into the neural network, traumatic memories are stored in a raw, maladaptive state with many of the painful emotions, beliefs, and images initially associated with them intact. Thus, when external or

internal cues prompt these memories into consciousness, the powerful, maladaptive thoughts and feelings initially associated with them are still there, forming the basis for psychopathology (Shapiro & Laliotis, 2011). By prompting the maladaptive, unintegrated memories into consciousness, combined with the neural processing presumably associated with bilateral EMs, EMDR allows these raw memories to link to adaptive networks that assist in reducing the irrational and maladaptive components of the memory into a less intense state (Shapiro & Laliotis, 2011). This allows the memories to be less distressing when brought into consciousness at a later time, as they are now fully integrated and correctly processed as less threatening, with the prior intense negative associations lessened or eliminated.

Does It Work?

There is significant evidence that EMDR is effective in the treatment of PTSD (Wilson et al., 2018). Chen et al. (2014) conducted a meta-analysis to examine the effectiveness of EMDR in treating PTSD. The authors declared no conflicts of interest. They analyzed 26 RCTs published between 1991 and 2013. To be included in this analysis, the RCTs had to include PTSD patients treated with EMDR that was administered by a trained professional, meet the requirements of an RCT as established by the Cochrane Collaboration, control patients received treatment or no treatment, and the assessment of clinical outcomes must have included a sufficient statistical analysis of effect size.

To assess for PTSD and related symptoms, the following measures were used across the various studies: Clinician-Administered PTSD Scale (CAPS), the PTSD checklist (PCL-C), the Child Report of Post-traumatic Symptoms (CROPS), the self-reported Symptom Checklist of the structured interview for PTSD (SI-PTSD) and the Impact of Event Scale (IES). Depression symptoms were also assessed using the Hospital Anxiety and Depression Scale (HADS),

Montgomery-Asberg Depression Rating Scale (MADRS), Beck Depression Inventory (BDI) and

Hamilton Depression Rating Scale (HAM-D) measures. Anxiety symptoms were assessed using

the Hamilton Anxiety Rating Scale (HAM-A), Beck Anxiety Inventory (BAI), and the State-

Trait Anxiety Inventory (STATE) measures. Subjective distress was assessed using the

Subjective Units of Distress Scale (SUDS). Use of measures was not consistent across RCTs,

limiting conclusions. All participants had a diagnosis of PTSD and were administered EMDR by

an EMDR trained clinician. EMDR was found to be effective at relieving PTSD symptoms,

depression, anxiety, and subjective distress in participants with a PTSD diagnosis. In 22 of the 26

RCTs examined PTSD symptoms as a primary outcome measure; the meta-analysis revealed a

significant but moderate effect size for PTSD symptoms ($g = 0.662$). This result implies that

PTSD is moderately effective at relieving PTSD symptomology. In 20 of the 26 RCTs examined

depressive symptoms were measured as a primary outcome following treatment. A significant

and moderate effect size for depressive symptoms was found ($g = 0.643$). This result indicates

that EMDR is moderately effective at relieving depressive symptoms.

In 16 of the 26 studies anxiety was examined as a primary outcome measure. The meta-

analysis revealed a significant and moderate effect size for anxiety symptoms ($g = -0.640$). This

result indicates that EMDR is moderately effective at relieving anxiety symptoms. Only 12 of the

26 studies examined subjective distress as a primary outcome measure. The meta-analysis

revealed a significant and large effect size of $g = -0.956$ for subjective distress. This result

indicates that EMDR is very effective at relieving symptoms of subjective distress. This meta-

analysis demonstrated that EMDR is effective in treating PTSD symptoms, anxiety, depression,

and subjective distress in clients with a PTSD diagnosis. Only 5 of the 26 RCTs involved

children, meaning conclusions drawn about children or adolescents are much more tentative than

those drawn about adults. Wilson et al. (2018) found the Chen et al. (2014) reviews to be valid and reliable and accepted the data up to this point. Wilson et al. (2018) continued by finding any other acceptable RCTs after the Chen et al. (2014) study ended.

Wilson et al. (2018) conducted a systemic review of RCTs involving the use of EMDR in treating PTSD as a continuation of the work by Chen et al. (2014). They found and examined four additional RCTs conducted after Chen et al. (2014). The first, Heide et al. (2016) took 70 refugees with a PTSD diagnosis and randomly assigned them to an EMDR treatment group, stabilization group, or a waitlist control group. Stabilization was defined as improving adaptation to PTSD symptoms and stress by focusing on the present (Heide et al., 2016). The researchers assessed PTSD, anxiety, depression, and quality of life as outcome measures. EMDR and stabilization were found to be more effective than the waitlist control group. EMDR was not more effective than stabilization at reducing PTSD symptoms, depression, anxiety, or improving quality of life. EMDR and stabilization both produced small or insignificant effect sizes for all primary outcome criteria (d = -0.03 to 0.38). Other trauma-focused therapies like exposure therapy usually produce much larger effect sizes in similar populations (d= 2.4 to 2.6 for exposure therapy). This result indicates that CBT-based therapies may be much more effective at treating refugee populations than EMDR.

Carletto et al. (2016) took 42 adult patients diagnosed with PTSD and Multiple Sclerosis (MS) and randomly assigned them to either receive EMDR or relaxation therapy. Relaxation therapy was defined as a treatment that taught participants a variety of relaxation techniques, these included progressive muscle relaxation, rapid relaxation, diaphragmatic breathing, visualization, and cue-controlled relaxation (Carletto et al., 2016). The primary outcome measure was whether patients still met criteria for a PTSD diagnosis six months after treatment according

to a CAPS administration. Researchers assessed depression, anxiety, and symptoms of trauma as outcome measures. Analysis revealed that EMDR is more effective at reducing PTSD diagnosis in individuals also diagnosed with multiple sclerosis when compared to relaxation therapy ($d = 0.82$). However, relaxation therapy and EMDR were both equally effective at reducing symptoms of anxiety and depression and improving quality of life. Trauma-focused therapies such EMDR are typically viewed as more effective than non-trauma focused interventions (such as relaxation therapy) at reducing PTSD symptoms (Shapiro, 2002). These results support this idea, as relaxation therapy was able to reduce non-trauma related symptoms equally as well as EMDR; however, EMDR was more effective than relaxation therapy at reducing trauma-related symptoms.

Acarturk et al. (2016) took 98 adult refugees diagnosed with PTSD and randomly assigned participants to either an EMDR treatment group or a waitlist control condition. Participants were assessed for symptoms of PTSD and depression. It was found that EMDR was more effective than the waitlist control group at reducing symptoms of PTSD ($d = 1.57$) and depression ($d = 1.58$). This shows that EMDR is again more effective than no treatment for refugees struggling with PTSD. However, EMDR was not compared to a competing trauma-focused treatment; as such, it is difficult to assess if a different trauma-focused intervention would have been more effective.

De Bont et al. (2016) conducted an RCT examining the effect of EMDR on treating clients who are diagnosed with PTSD and a comorbid psychotic disorder. The study took 155 participants and randomly assigned them to either an EMDR treatment group, a prolonged exposure (PE) treatment group, or a waitlist control condition. EMDR ($d = 0.59$) and PE ($d = 0.62$) were found to be superior to the waitlist condition at reducing psychotic symptoms. Both

EMDR and PE produced lasting decreases in severity of paranoid thoughts and increases in rates of remission from the primary psychotic disorder. Only PE ($d = 0.78$) significantly decreased depression symptoms, while the waitlist control condition and EMDR did not significantly reduce depression symptoms. The three conditions did not differ on auditory-visual hallucinations or social functioning. This indicates that EMDR and PE can be used to reduce PTSD and psychotic symptoms in PTSD patients with comorbid psychotic disorder. PE decreased depressive symptoms as well, however EMDR did not. This could be due to the increased intensity of exposure and the amount of homework offered by PE but not EMDR. The potentially increased intensity of activation in PE could result in an increased sense of accomplishment and confidence, allowing for greater habituation to feared stimuli and perhaps lowering of symptoms. The increased amount of homework may also work to build competency and a personal sense that the client can be successful, also increasing confidence and lowering symptoms. Overall, De Bont et al. (2018), found that EMDR was effective at treating PTSD in participants, even with a comorbid psychotic disorder present.

Valiente-Gómez et al. (2017) conducted their own systemic review to specifically further examine the effectiveness of EMDR in treating adult clients with PTSD and other common comorbid disorders. While all the studies included in this meta-analysis were included in the Wilson et al. (2018) review, this meta-analysis specifically groups and analyzes RCTs that involve using EMDR in treating clients with comorbid disorders, making it uniquely useful. They analyzed 17 RCTs that involved using EMDR to treat participants with psychosis, bipolar disorder, unipolar depression, anxiety disorders, substance use disorders, and chronic back pain who also have a comorbid PTSD diagnosis. Sample sizes ranged from 12 participants to 155 participants. EMDR was consistently found to be effective at reducing PTSD symptoms in

patients with any comorbid disorder. EMDR was found to be moderately effective at reducing negative psychotic symptoms and paranoid thoughts compared to a control group ($d = 0.60$). EMDR was found to be moderately effective at reducing anxiety symptoms ($d = 0.40$), and moderately effective at reducing chronic back pain ($d = 0.79$). EMDR was found to be moderately effective at reducing depressive symptoms. EMDR was not effective at reducing bipolar symptoms or reducing substance abuse disorder symptomology. These results indicate that EMDR improves trauma-related symptoms in clients with a PTSD diagnosis who have another comorbid disorder. Results indicate that EMDR could also have a minor to moderate effect on treating the primary disorder ($d = 0.40$ to 0.79), but further research is needed. This implies that EMDR can be used to reduce trauma-related symptoms in patients with comorbid psychiatric disorders. However, it should not be used as a primary treatment for these disorders (other than PTSD), as the gains in other aspects of symptomology outside of trauma were minimal to moderate.

Moreno-Alcazar et al. (2017) also conducted a meta-analysis to evaluate the effectiveness of EMDR in treating adolescents and children with PTSD. The authors declared no conflicts of interest. They analyzed eight RCT's in total. Many of these studies were examined in previous meta-analyses, but this study provides unique value by analyzing only children and adolescent clients. Symptoms of PTSD, anxiety, and depression were measured. EMDR was found to be moderately effective at reducing trauma symptoms in children or adolescents with a PTSD diagnosis ($d = -0.36$ to -0.58). EMDR was found moderately effective at reducing anxiety symptoms ($d = -0.37$ to -0.55). EMDR was found not to be effective at reducing depressive symptoms ($d = -0.11$). Further analysis revealed that studies that included mostly male participants produced smaller and nearly null effect sizes across the different types of symptoms.

Studies that compared EMDR to CBT revealed nearly null effect sizes across different domains of symptoms. This indicates that EMDR may be less effective at treating males than females and that the differences between CBT and EMDR in treating adolescents and children with PTSD are very minimal. Various forms of CBT were used in comparison to EMDR therapy, and different outcome measures were used across studies, limiting the conclusions that can be drawn.

Further searching for RCTs not included in the previous meta-analyses revealed two relevant RCTs. The first, Chen et al. (2018), examined the use of EMDR in treating complex childhood trauma (CT) in both children and adults. The authors declared no conflicts of interest. CT includes intensely traumatic events that occur in childhood, are often repetitive, and lead to a disruption in personality development that can lead to a deterioration of trust in important relationships (Kliethermes et al., 2014) and possibly neurological development (Ford & Courtois, 2009). Some examples of CT include sexual abuse, emotional abuse, and familial violence. They identified six RCTs for analysis. These studies were included in previous meta-analyses, but the grouping of only CT RCTs for analysis gives this study unique value. Three studies investigated the use of EMDR in children with CT. It was found that EMDR is associated with significant decreases in PTSD diagnoses and symptoms in this population. Three studies investigated the use of EMDR in adults with CT. EMDR is associated with significant decreases in PTSD diagnosis and symptoms in adults with CT. Studies included in this review were very heterogeneous, with participants experiencing different types of trauma, differing control conditions, differing treatment lengths, use of different measures across studies, and variable follow-up lengths. The low number of studies, participants, and lack of homogeneity limits conclusions that can be drawn. Overall, EMDR looks promising in the treatment of CT in both adults and children, but further research is needed.

Yurtsever et al. (2018) conducted an RCT to examine the effectiveness of EMDR Group Intervention (EMDR G-TEP) in treating refugees with PTSD diagnoses. They took 47 adult refugees with PTSD diagnoses and randomized the participants to receive EMDR G-TEP or no treatment. Participants were evaluated pre-treatment, post-treatment, and at a four week follow-up. EMDR G-TEP was found to reduce PTSD diagnoses and symptoms significantly, and depressive symptoms compared to the control group at post-treatment. However, at the four week follow-up gains were not maintained and there were no significant differences between the treatment group and control group. This suggests that EMDR G-TEP is effective at treating PTSD symptoms in the short term but loses gains once treatment is discontinued. This study included 11 males and 36 females, meaning conclusions about men are less certain.

EMDR appears to be effective in treating PTSD and trauma-related symptoms in adults, children (Chen et al., 2014; Moreno-Alcazar et al., 2017; Wilson et al., 2018), and in people who have comorbid disorders (Valiente-Gómez et al., 2017). Data on comorbid disorders and children is much more limited than data on PTSD in adults, limiting the conclusions that can be drawn. EMDR was consistently shown to be moderately effective at decreasing anxiety symptoms and depressive symptoms in those with PTSD. EMDR was shown to be more effective at reducing PTSD symptoms than no treatment in refugees with PTSD. Overall, the low number of studies and lack of heterogeneity among them calls for more research before more certain conclusions can be drawn. However, these research results indicate that EMDR is efficacious at treating PTSD in a variety of situations and populations. EMDR also may be moderately effective at relieving depression and anxiety symptoms in those with PTSD. While EMDR has significant evidence that it is efficacious, how does it compare to other PTSD treatments?

What Is CBT?

The most common forms of treatment for PTSD other than EMDR are various forms of cognitive behavioral therapy (CBT) such as trauma-focused cognitive behavioral therapy (TF-CBT) and exposure therapy (ET; American Psychological Association, 2017). Cognitive Behavioral Therapy involves clients identifying their maladaptive or unhealthy beliefs. Once these beliefs are identified, their maladaptive, unreasonable, nature is examined and discussed with a therapist. Using CBT principles, clients' maladaptive beliefs and behaviors are replaced with more adaptive thoughts and behaviors. These new thoughts and behaviors are more reasonable, congruent with reality, and produce better emotional outcomes (Ellis & Harper, 1975). In the case of trauma-focused CBT(TF-CBT), clients' maladaptive thoughts and behaviors surrounding their trauma, such as the likelihood of such a trauma reoccurring, or what the trauma means about the client, are examined and changed to be more realistic and adaptive, leading to improved PTSD symptoms (Kerig, Sink, Cuellar, Vanderzee, & Elfstrom, 2010).

What is Exposure Therapy?

Exposure therapy is a treatment that typically involves clients developing a fear hierarchy with the clinician (Mørkved et al., 2014). A fear hierarchy is a list of various stimuli that prompt fear symptomology in the client. The clinician provides a safe environment where the client can be systematically exposed to these stimuli via a variety of methods depending on what best fits the clients' needs. Exposure can involve the confrontation of fears in real life (in vivo exposure). Alternatively, imaginal exposure is when the client imagines the feared object, situation, or activity. This form of exposure is most commonly used with PTSD (Mørkved et al., 2014).

Primarily, clients are exposed to their feared stimulus in some fashion, in a safe environment, so that they can habituate to the negative emotions and thoughts. Over time, this

reduces clients' emotional response to the fearful situations, resulting in a decreased need to escape or avoid these situations (Mørkved et al., 2014). Often, relaxation or stress reduction techniques such as breathing retraining are taught to clients to help them deal with the stress and emotionality associated with engaging with and not avoiding their fearful stimuli (Mørkved et al., 2014). As clients habituate to their feared stimuli, their anxiety and reactions to said stimuli decrease. This leads to higher self-efficacy; as clients become confident, they can face their fears. It also helps with the emotional processing of fear, as the client can attach new, more reasonable, beliefs about feared stimuli during the exposure period (Bryant et al., 2008). This allows the client to become more comfortable with dealing with said fear. Overall, guided, structured exposure to the feared stimuli, while not allowing avoidance responses, leads to clients habituating to their fears, leading to decreased adverse physiological and psychological reactions, or decreased symptoms (Mørkved et al., 2014)**.** This leads to the development of increased competency and allows clients to replace maladaptive beliefs with more realistic adaptive beliefs (Bryant et al., 2008).

Do CBT and ET Work?

Cusack et al. (2016) conducted a meta-analysis to assess the effectiveness of various methods of treatment for adult PTSD. They also assessed the strength of evidence (SOE) for the various treatments. SOE is determined by considering the risk of bias, consistency, directness, and precision of the evidence. SOE also considers domains such as the strength of association and is rated as either high, moderate, low, or insufficient. Cusack et al. (2016) included articles published from 1980 to May 24, 2012. They analyzed 31 RCTs utilizing CBT or various forms of CBT. When ET was compared to inactive control conditions (conditions in which no treatment was being received), it was found to be very effective at reducing PTSD symptoms (*d*

= -1.27) with a high SOE. ET was found to be very effective at decreasing PTSD diagnoses, with participants receiving ET 66% more likely to not have a PTSD diagnosis than those in an inactive control group, with a moderate SOE.

ET was found to be moderately effective at reducing depression symptoms when compared to no treatment control groups with a weighted mean difference (WMD) on the BDI-II of -8.2 with a high SOE. When compared to no treatment control groups, mixed forms of CBT (CBT-M) were found to be very effective at reducing PTSD symptoms (d = -1.09) with a moderate SOE. CBT-M was found to be effective at reducing PTSD diagnoses, with CBT-M participants 26% more likely to not receive a diagnosis of PTSD at follow-up compared to inactive control conditions, with moderate SOE. CBT-M was found to be effective at reducing depressive symptoms (BDI-II WMD = -10.4), with moderate strength of evidence. This implies that various forms of CBT are effective at reducing PTSD symptoms and diagnoses as well as reducing depressive symptoms, and that the evidence for this is moderate to very strong. Cusack et al. (2016) continue by comparing various treatments for CBT against other active treatment groups (groups where an alternative treatment was administered). Almost all comparisons were determined to have insufficient SOE from which to draw conclusions. Moderate evidence was found for ET being superior to relaxation therapy for treating PTSD symptoms and reducing depressive symptoms. There was also moderate evidence that CBT-M is more effective at treating PTSD symptoms than relaxation therapy. Overall, Cusack et al. (2016) found CBT and its various forms to have the highest SOE, and the highest demonstrated efficacy of any treatment examined.

Morina, Koerssen, and Pollet (2016) conducted another meta-analysis of 41 RCTs to analyze the efficacy of various treatments for child and adolescent PTSD. The authors declared

no conflicts of interest. It was found that various forms of TF-CBT were very effective at reducing PTSD symptoms ($g = 1.44$) when compared to inactive control conditions and when compared to active control conditions ($g = 0.66$). The evidence for CBT was again found to be the most robust when compared to other treatments. Heterogeneity was very high amongst the studies limiting conclusions that can be drawn. This demonstrates that various forms of CBT are also effective at treating children and adolescents.

Outside of these meta-analyses, six relevant RCTs were found and examined. Zandberg et al. (2016) conducted an RCT to investigate the effect of PE and client-centered therapy (CCT) on co-occurring emotional and behavioral problems in adolescents diagnosed with PTSD. The authors did not report any conflicts of interest. Participants included 61 adolescent girls diagnosed with PTSD from a community mental health clinic in Philadelphia that provides counseling to survivors of sexual abuse. Participants' ages ranged from 13 to 18 and participants had all experienced some form of sexual trauma resulting in a PTSD diagnosis. Participants were randomly assigned to receive prolonged exposure (PE) or client-centered therapy (CCT). Participants were assessed before treatment, post-treatment, and at three, six and 12-month follow-ups. It was found that PE and CCT both significantly reduced internalized symptoms, which includes anxiety, depression, and somatic complaints. PE and CCT both also significantly reduced somatic disorder and obsessive compulsive problems as well as posttraumatic stress problems. There were no significant differences between the two groups within these domains. Both groups showed a significant reduction in externalized symptoms, which include rule-breaking behaviors and aggressive behaviors scales. However, PE, when compared to CCT, was associated with more significant gains in these domains that were maintained at follow-ups with moderate to large effect sizes ($d = 0.62$ to 0.78). This indicates that, while both CCT and PE are

very effective at reducing symptoms associated with PTSD in adolescents, PE provides stronger symptom reduction, particularly for externalized symptoms such as conduct problems. This again demonstrates the effectiveness of CBT-based interventions in treating PTSD in adolescent populations.

Jensen, Holt, and Ormhaug (2017) conducted an RCT to examine TF-CBT in the treatment of adolescent PTSD. The authors declared that they have no conflict of interest. The participants consisted of 156 male and female adolescents with a PTSD diagnosis. Participants had experienced various forms of trauma. Participants were randomly assigned to either a TF-CBT group or Treatment as Usual (TAU) control group. TAU was defined as any treatment that was not TF-CBT. The Child PTSD Symptom Scale (CPSS) was used as the primary outcome measure. Scores over 15 on the CPSS are considered clinically significant PTSD symptoms. A significant difference was found between the two groups with TF-CBT being found superior to treatment as usual, with an average reduction of 16.77 on the CPSS compared to 13.73 for the TAU group. Gains were maintained at long term follow-ups (LTFU). The results of this study suggest that TF-CBT is efficacious at reducing PTSD symptoms in adolescents with various forms of trauma.

Shein-Szydlo et al. (2016) examined using CBT to treat PTSD in 100 homeless children living in Mexico City. The authors declared no conflicts of interest. This population is at high risk for repeated victimization and trauma (Shein-Szydlo et al., 2016). Participants were randomly assigned to either a CBT treatment group or a waitlist control condition. The PTSD symptoms of children in the CBT group significantly decreased compared to the waitlist control group. CBT was found to be very effective at reducing PTSD ($d = 1.75$), depression ($d = 1.48$), and anxiety symptoms ($d = 1.05$) when compared to the waitlist control condition. This again

demonstrates that CBT is effective at treating PTSD in children. It also demonstrates that CBT can be effective at reducing PTSD symptoms in children who suffer repetitive traumas.

Popiel, Zawadzki, Pragłowska, & Teichman (2015) conducted an RCT to examine the efficacy of PE compared to paroxetine therapy in treating PTSD in adults following a motor vehicle accident. The authors declared no conflict of interest. The 228 adults were randomly assigned to PE, paroxetine therapy, or a group that received both (combination group). All groups significantly improved throughout treatment. The remission rate of PTSD was significantly better after PE (65.5% remission rate) when compared to the paroxetine therapy group (43.3% remission rate). The combination group was not significantly different from either group. This again demonstrates that forms of CBT such as PE can be effective at treating PTSD in adults, even more so than based pharmacological therapies.

Acierno et al. (2017) conducted an RCT to examine if PE delivered via home-based telehealth (PE-HBT) produced similar results to PE delivered in-person (PE-IP) when delivered to clients with a PTSD diagnosis. The authors declared no conflicts of interest. The 150 adult participants were randomly assigned to receive either PE-HBT or PE-IP. There were no significant group differences. Both groups were found to be very effective at reducing PTSD symptoms, with large effect sizes when comparing baseline PTSD symptoms at post-treatment ($d = 1.24$), at a three month follow-up ($d = 1.32$), and at a six month follow-up ($d = 1.04$). This, once again, reiterates that PE can be a very efficacious treatment for PTSD and that the HBT delivery of it is equally efficacious to in-person delivery. This indicates that forms of CBT like PE can be efficacious even when not delivered in person.

Foa et al. (2018) conducted an RCT to examine the use of massed prolonged exposure (MPE), spaced prolonged exposure (SPE) and Present Centered Therapy (PCT) on combat-

related PTSD in a veteran population. MPE was defined as 10 PE sessions delivered over a two-week time frame, while SPE was defined as 10 PE sessions delivered over an eight-week time frame. The authors revealed that they receive funding from the Department of Defense, the Department of Veteran Affairs, and the National Institutes of Health, and receive royalties from books on PTSD treatment as potential conflicts of interest. Foa et al. (2018) selected 370 American veterans and randomly assigned them to a group that received either MPE, SPE, PCT, or a minimal contact control (MCC). MPE demonstrated a substantial and significant reduction in PTSD symptoms from pre to post-treatment ($d = 1.04$). SPE demonstrated a large and significant effect on PTSD symptoms from pre to post-treatment ($d = 0.84$). PCT demonstrated a large and significant effect on PTSD symptoms from pre to post-treatment ($d = 0.87$). MCC demonstrated a significant but small effect on PTSD symptoms between pre and post-treatment ($d = 0.33$). When compared to the MCC, MPE was significantly more effective at reducing PTSD symptoms with a moderate effect size ($d = 0.56$). When compared to MPE, SPE was not significantly different. When SPE was compared to PCT, the difference was also not significant. The difference between MPE and PCT was also not significant. This indicates that MPE, SPE, and PCT are efficacious at treating combat-related PTSD in veterans. This indicates that PE can be rapidly administered in a shorter time frame and still be effective at treating PTSD. This demonstrates the potential for flexibility in administration for PE while remaining efficacious. Treatment can be accelerated to be administered in a short, intense, burst and still maintain efficacy.

Which One Is Better?

If EMDR therapy is going to be worth its investment, it would need to perform better than competing treatments. Searching for RCTs that directly compared CBT to EMDR identified

five relevant meta-analyses and one study. Chen, Hu, Liang, & Zhang (2015) conducted a meta-analysis specifically comparing CBT interventions to EMDR in the treatment of adults with PTSD. They analyzed 11 RCTs published between 1989 and 2013 that directly compared CBT to EMDR. Included studies had participant sample sizes ranging from $n = 12$ to 140. The authors declared no conflict of interests. This analysis once again found significant results that both EMDR and various forms of CBT are effective at reducing PTSD symptoms. EMDR performed moderately better than CBT at relieving PTSD symptoms ($d = -0.43$). Analysis of PTSD subscales found that EMDR was moderately better at relieving arousal ($d = -0.68$) and is marginally better at reducing the severity of intrusions ($d = -0.37$) associated with PTSD when compared to CBT. There was no significant difference between EMDR and CBT on the avoidance subscales. Measures used between studies varied moderately, limiting conclusions that can be drawn. Many forms of CBT (including "unstandardized" CBT) were compared to a strict protocol of EMDR as well, with no set protocol or form of CBT used consistently across studies, also limiting the conclusions that can be drawn. Studies generally had low sample sizes and had significant heterogeneity, further liming conclusions that can be drawn. Overall, the lack of consistent outcome measures, low sample sizes, and comparisons to various forms of CBT makes it difficult to draw meaningful conclusions from this analysis.

Kline et al. (2018) conducted a meta-analysis of 32 RCTs to compare differing psychotherapies with adults with PTSD. Specifically, they wanted to see how the different treatments fared at maintaining treatment benefits at a LTFU. They defined LTFU as a follow-up evaluation that occurs six months or more after the end of treatment. The authors declared no conflicts of interest. Articles from 1980 through 2015 were included. Samples sizes ranged from 30 to 284 participants. Studies that had under 30 participants or a high risk of bias were

excluded. Studies had high heterogeneity, limiting conclusions that can be drawn. EMDR was compared to various forms of CBT, including mixed forms and ETs. It was found that all active treatment conditions, when compared to inactive or no treatment control groups, were significantly better at reducing PTSD symptoms from pre-treatment to the LTFU, with a large effect size ($d = 2.04$). No significant difference was found between active treatment conditions when comparing them at post-treatment. Comparing active treatment conditions at the LTFU revealed that ET's are significantly more effective at maintaining gains at the LTFU compared to EMDR and other forms of CBT ($d = -0.27$). This suggests that, while EMDR and other forms of CBT are effective at treating PTSD and can maintain gains for long periods of time, they do not offer as much long-term benefit as ET. ET's have more intense and more prolonged periods of exposure to the traumatic stimuli than other therapies (Mørkved et al., 2014). A distraction-like element, such as EM, is also not included in ET. EM could potentially distract the client from the traumatic stimuli, lowering the intensity of the exposure. This more direct confrontation may lead to greater habituation to the feared stimuli and produce greater confidence in a client's ability to handle traumatic triggers. All of these factors may lead to higher maintenance of gains at LTFU compared to EMDR and other therapies that do not offer as intense exposure to traumatic elements as ET does during treatment.

The previously mentioned meta-analysis conducted by Morina, Koerssen, and Pollet (2016) also directly compares EMDR to CBT in the treatment of adolescent and childhood PTSD. The 39 RCTs selected involved the use of various psychotherapies to treat PTSD, including TF-CBT, Classroom Based Interventions (CBI), EMDR, Psychodynamic therapy (PDT), multidisciplinary treatment (MDT), CBT, and CCT. Only four of the RCTs involved EMDR and 32 involved some form of CBT. Two RCTs involved the use of medication therapies

in the treatment of child PTSD. The authors did not comment on whether they had any conflicts of interest. Studies from 1980 to April 2015 were included. Participant sample sizes ranged from 12 to 242. Heterogeneity between studies was substantial. When comparing active treatment experimental groups to waitlist control groups in reduction of PTSD symptoms at post-treatment, a significant mean effect size of $g = 0.83$ was found. When comparing active treatment experimental conditions, to other active treatment control conditions a significant effect size was still found ($g = 0.41$) for reduction of PTSD symptoms.

When examining PTSD symptom reduction at follow-up, experimental groups produced significant PTSD symptom reduction with small effect sizes when compared to waitlist control conditions ($g = 0.35$) and active control conditions ($g = 0.46$). Out of all of these treatments, CBT-based interventions, specifically, TF-CBT, produced the largest effect size $d = 1.14$ compared to waitlist controls at post-treatment, and $d = 0.44$ when compared to active treatment control groups at post-treatment). TF-CBT maintained its effect size ($d = 0.44$) when compared to active control conditions at follow-up. Due to a low number of trials, comparisons to a waitlist control group at follow-up could not be made. This indicates that both EMDR and CBT are efficacious at treating adolescent and child PTSD. TF-CBT may be moderately more effective at treating child/adolescent PTSD than other psychological interventions such as EMDR. Overall, this analysis again demonstrates that available treatments for child and adolescent PTSD, including both CBT-based interventions and EMDR, are effective at reducing PTSD symptoms when compared to waitlist and active control groups. Only TF-CBT was able to differentiate itself from other treatments in efficacy, indicating that it might be more efficacious than other treatments, including EMDR, at treating child/adolescent PTSD.

The previously mentioned meta-analysis conducted by Cusack et al. (2016) also directly compares EMDR to CBT in the treatment of PTSD. They identified two trials that directly compared EMDR to ET. The strength of evidence was considered insufficient due to the low number of trials, low statistical significance, and imprecise results. However, both trials had ET as more effective at reducing PTSD diagnoses in clients than EMDR (Risk difference = 0.14). There was no significant difference found between EMDR and ET in reducing PTSD or depression symptoms. This indicates that ET could be more efficacious than EMDR, but more evidence is needed to draw conclusions. Cusack et al. (2016) also determined that the SOE for EMDR was low to moderate, while the SOE for CBT-based interventions was moderate to high. This indicates that the evidence available for CBT is more robust.

Khan et al. (2018) conducted a meta-analysis to compare the efficacy of EMDR and CBT in treating PTSD. The authors declared no conflicts of interest. Many forms of CBT were used in this analysis. The types of CBT used were: imaginal exposure (IE), trauma treatment protocol (TTP), prolonged exposure (PE), TF-CBT, stress inoculation training with prolonged exposure (SITPE), exposure plus cognitive restructuring (E + CR), and brief eclectic psychotherapy. The lack of homogeneity among types of CBT limits the conclusions that can be drawn from this meta-analysis. The review articles published between 1999 and December 2017 were included in the search. Khan et al. (2018) identified 14 RCT's for inclusion in the study. Participant samples varied considerably, with sample sizes ranging from 14 participants to 155. Samples were also predominantly composed of female participants. All studies were assessed for bias using the Cochrane tool (Khan et al., 2018). There was a high risk of bias in four studies regarding blinding of outcomes. Only four studies reported allocation concealment. This dramatically limits the conclusions that can be drawn from this meta-analysis. When comparing EMDR to

CBT in PTSD symptoms reduction at post-treatment, EMDR was found to be significantly more effective than CBT with a moderate effect size ($d = 0.43$). A comparison of the two treatments effect on reduction in PTSD symptoms at a three-month follow-up revealed no significant difference between the groups. Examining anxiety symptoms at post-treatment revealed that EMDR is significantly better than CBT ($d = 0.71$). There was insufficient data to compare anxiety at a longer-term follow-up. Comparing CBT and EMDR on depressive symptom reduction at post-treatment, and at a three month follow-up, revealed no significant differences between the two groups. Heterogeneity was high amongst all comparisons, limiting the conclusions that can be drawn. This evidence suggests that EMDR is better than CBT at reducing PTSD symptoms and anxiety at post-treatment, but that these gains compared to CBT are not maintained long-term. This implies that benefits gained from EMDR might not last in the long term. Many different forms of CBT were compared to one standardized version of EMDR, limiting the conclusions that can be drawn. EMDR is a treatment specifically designed for PTSD, while only a few types of CBT are trauma-focused (ET and TF-CBT). Comparing EMDR to types of CBT not specifically recommended for PTSD, limits conclusions that can be drawn. ET has been found to be the most effective form of CBT in the treatment of PTSD (Cusack et al., 2016) A comparison of EMDR to only trauma-focused forms of CBT like ET would better compare the efficacy of treatments. Overall, the low quality of the evidence presented in this meta-analysis limits conclusions that can be drawn.

After all relevant meta-analyses were examined, one more relevant RCT was found. Roos et al. (2017) conducted an RCT to compare CBT and EMDR in the treatment of childhood PTSD. The study included 103 children participants who were divided randomly into three groups: an EMDR group, a CBT group, and a waitlist control group. EMDR and CBT were

found to be equally effective at post-treatment when compared to waitlist control groups and maintained gains at LTFUs. EMDR and CBT both enjoyed large effect sizes of $d = 1.27$ and $d = 1.24$, respectively. No significant differences were found between EMDR and CBT in the reduction of PTSD symptoms. This indicates that both EMDR and CBT are equally efficacious in the treatment of childhood PTSD.

Is CBT Different? Do the EMs Matter?

EMDR and CBT, particularly EMDR and ET, all share many components. They all involve confronting fearful or traumatic stimuli until the client can learn to habituate to the negative emotionality and thoughts associated with the stimuli (Mørkved et al., 2014; Shapiro, 2002). The most significant difference between EMDR and ET/CBT is the use of EMs, or similar stimuli, in EMDR. For EMDR to meaningfully distinguish itself from other treatments like ETs, the novel component of EMs would have to demonstrate a significant role in producing the therapeutic changes caused by EMDR. Two relevant meta-analyses examining the role of EMs in EMDR were identified.

In the first, Landin-Romero, Moreno-Alcazar, Pagani, & Amann (2018) conducted a systemic review of all research studies from 1989 through December 2017 that investigated the role of EM in EMDR. The authors declared that they have been invited as speakers at national and international EMDR conferences and that EMDR's creator, Shapiro, proofread the manuscript of the paper as potential conflicts of interest. Participant sample sizes ranged from 0 to 108 participants, as non-empirical papers were included in this review. The study included 87 papers in the systematic review. The studies were broken down into three broad groups based on the overarching models for the mechanism of action in EMDR presented; psychological models, psychophysiological models, and neurobiological models.

Thirty-two studies are included in the psychological model's group. This model states

that a cognitive/psychological mechanism is the underlying cause of EMDR's effects.

Armstrong and Vaughan (1996) were the first to suggest that an orienting response (OR) is

responsible for EMDR's effects. An OR is described as a natural, attentional response that can

happen with any novel environmental stimulus and results in a specific set of changes in the

organism that increase the preparedness of that organism to respond to danger (Armstrong &

Vaughan, 1996). Armstrong and Vaughan (1996) argued that EM could trigger an OR that, in

the absence of actual danger, would result in accessing of the traumatic memories without

avoidance responses that would lead to a rapid decrease in symptoms after the individual's mind

determined no danger was present. MacCulloch & Feldman (1996) and Wilson, Silver, Covi, &

Foster (1996) also both proposed that the EM in EMDR triggers an OR and that this OR pairs an

adaptive explorative response that reduces PTSD symptoms. There is little to no empirical

support for these models, and as such, more investigation is needed to determine their accuracy.

Sharpley, Montgomery, & Scalzo (1996) were the first to suggest that the effects of

EMDR are caused by distancing from the traumatic memory and the reduction of imagery

vividness produced by EMs. This model posits that EM disrupts an individual's working

memory, reducing the vividness and emotionality of traumatic stimuli. Empirical evidence has

demonstrated that EMs, and other tasks that require attention, such as focusing on beeps or tones

instead of EMs, can disrupt working memory resources that result in objectively worse memory

recall. These tasks also reduce the vividness and emotionality of memories during and shortly

after recall (van den Hout, Bartelski, & Engelhard, 2013).

The review included 18 studies that proposed that psychophysiological models explain

the effects EMDR. These models posit that EM and the dual attentional tasks associated with

EMDR lead to particular psychophysiological changes that cause treatment effects. EMs in EMDR trigger parasympathetic responses that cause physiological relaxation and improvement of PTSD symptoms. The parasympathetic or relaxation responses that have been demonstrated to be caused by EM include the lowering of pulse rate, skin conductance, heart rate, and breathing rate while performing EMs (Sack, Lempa, Steinmetz, Lamprecht, & Hofmann, 2008). These functions were elevated when EMs were not performed. One study (Lee, Taylor, & Drummond, 2006) found that EMDR with the EMs produced a distancing effect from the trauma when compared to EMDR without EMs. This means that patients who underwent the EMs felt more detached and distanced from their trauma when compared to those who did not undergo EMs during EMDR. This distancing effect was associated with lower scores on the IES at post-treatment. This indicates that EMs help detach clients from their trauma and that this is associated with better symptom improvement, as the detachment results in them being able to more thoroughly engage in treatment, or engage at all (Jeffries & Davis, 2013). However, this effect is small and might not last at LTFUs. Other studies (Kline et al., 2018, Rothbaum, Astin, & Marsteller, 2005) have found that while EMDR might be similar to CBT-based therapies at post-treatment, EMDR often does not maintain its gains at LTFUs, while CBT-based therapies do. Reducing the vividness and intensity of traumatic memories, or having more distance from them, may offer short term improvement, but may ultimately lessen the habituation to the feared stimuli, resulting in less long term symptom improvement.

Another psychophysiological model for EMDR's effects (Stickgold, 2002) proposes that the rhythmic, multi-saccadic EMs in EMDR work like the rapid-eye-movements observed during REM sleep. REM sleep has demonstrated many adaptive functions, including memory consolidation (Born, Rasch, & Gais, 2006). This psychophysiological model proposes that the

EMs in EMDR can integrate emotionally charged memories into general semantic networks similar to the REMs in REM sleep (Shapiro, 2014). There is no direct evidence for this model, and the EMs during REM are much more rapid than the EMs found in EMDR (Landin-Romero et al., 2018)

Modern technological advancements have allowed for EMDR researchers to more thoroughly explore neurobiological models. These advanced techniques have revealed associations between EMDR therapy, and the hyperarousal of subcortical limbic and thalamic structures associated with PTSD symptoms. After EMDR, lower arousal of these PTSD-associated areas, and greater cortical control of them has been demonstrated (Bossini et al., 2017). It is important to note though that these effects are observed in other treatments focused on trauma or anxiety and that the physiological foundations for these results are still unknown (Landin-Romero et al. 2018). Some of the studies included in Landin-Romero et al.'s (2018) review also did not investigate using EMDR with and without EMs, they just examined the effects of the full EMDR protocol, making it very difficult to distinguish the role of EMs from the other components of EMDR. This review also examined a meta-analysis by Lee and Cuijpers (2013).

Lee and Cujipers (2013) examined 26 RCTs involving the use of EMDR with and without EMs in both clinical (15 studies) and laboratory settings (11 studies). It was found that EMDR with EMs when compared to EMDR without EMs was significantly more effective at treating PTSD symptoms in clinical settings with a small effect size ($d = 0.27$). In laboratory settings, it was found that EMs and other similar tasks moderately reduced the vividness and emotionality of a recalled autobiographical memory ($d = 0.66$) when compared to a group who only recalled an autobiographical memory. This study indicates that the EMs in EMDR may

have a small effect on PTSD symptom relief, and moderately decreases the emotionality and vividness of recalled traumatic memories. The clinical studies included did not have consistent outcome measures, did not consistently use clinicians trained in EMDR, or consistently use treatment manuals. Some studies used actual clinical populations while some only used student volunteers. All outcome measures were also completed post-treatment, meaning that the symptom improvement may not be maintained at LTFU. The small effect size and the previously mentioned factors make it difficult to draw further conclusions form this analysis. Furthermore, the reduction in memory vividness and intensity was in non-clinical populations and did not include any other elements of EMDR. Reduced memory vividness and emotionality may make a client more likely to engage further in therapy but may ultimately reduce habituation to traumatic stimuli.

Many of the included studies also have significant methodological limitations, including small sample sizes, no control conditions, non-clinical populations, and inconsistent conceptualizations. The various models in this review are also poorly categorized, as the vast majority of the studies use a combination of psychological, physiological, and neurobiological components to explain the effects of EMDR. The potential conflicts of interest also give this review a substantial risk of bias. Overall, while EMDR is associated with working memory impairment and changes in brain activity, more high equality evidence is needed to actual distinguish EMs role in these observations

The second meta-analysis (Davidson & Parker, 2001) examined 13 studies between 1988 to April 2000 that analyzed the role of EMs in EMDR. This was done by comparing EMDR therapy with EM to EMDR therapy without EMS. Participant sample sizes ranged from 15 to 41 with a total of 382 participants. Davidson and Parker (2001) concluded that there was no

significant difference between the two groups, that EMDR performed the same with or without

EMs ($r = 0.07$). Replacing the EMs with similar moving stimuli, such as beeps or tones, was also

found to be equally effective to EMDR with EMs and EMDR without EMs ($r = 0.00$). This

indicates that the beneficial aspects of EMDR are not gained by the EMs, but by the other

aspects of the treatment. Considering the extreme similarities between EMDR and ET based

interventions, the novel EM component of EMDR being irrelevant to treatment outcomes

indicates that EMDR and various forms of CBT, like ET.

The included studies in Davidson and Parker (2001) had higher methodological rigor than

those in the Landin-Romero et al. (2018) review. Focusing on empirical studies that included

randomization and included more direct comparisons of EMDR with and without EMs. Even

though the studies in Davidson and Parker (2001) appear to meet the criteria for inclusion in

Landin-Romero et al. (2018), they were not included. Not including direct, controlled, and

randomized comparisons of EMDR with and without EMs raises severe concerns about Landin-

Romero et al.'s (2018) review, especially considering the low quality of the studies included and

their potential conflicts of interest. As such, the Davidson and Parker (2001) review should be

weighed much more heavily when considering the role of EMs in EMDR, even though the

review is substantially older. The highest quality, most direct comparison of EMDR with and

without EMs, demonstrated that the EMs are irrelevant. While more high-quality research is

needed to draw stronger conclusions, the role of EMs in EMDR appears to be minimal to

insignificant (Davidson & Parker, 2001).

Cost

EMDR requires additional training as therapists must be formally certified in EMDR to

administer the treatment. Training is offered by the EMDR Institute and requires a fee, with

complete training costing upwards of 1,600 dollars (EMDR Institute, 2018) Training requires

completion of two three-day weekend training sessions involving additional room and board

costs, assuming that the training is not offered where the clinician resides. The degree of burden

these factors will place on clinicians will differ depending on their situation. Private clinicians

who have to spend multiple days away from their practice will also lose income from clients they

could have seen, and that cost must be added to the cost of the training. A clinician working for a

major mental health provider, who may have the training and time away paid for, will have an

easier time and a lower total cost to acquire the training compared to an independent clinician or

smaller practice. Beyond standard mental health care provider licensing in their area, clinicians

do not have to pay additional funds to be certified and administer CBT or ET, lowering the cost

to administer these treatments in comparison to EMDR.

EMDR usually lasts between six to twelve sessions (American Psychological

Association, 2017) compared to nine to twelve for ET (American Psychological Association,

2017) and 12 to 16 for CBT (American Psychological Association, 2017). This allows clinicians

to complete both treatments in a similar time frame. The cost of each individual session to a

client will vary significantly from clinician to clinician, regardless of treatment. This means that

the cost of each treatment to a specific person will vary considerably depending on the providers

available to each client. With all this in mind, the cost-benefit analysis will be an individual

calculation for each clinician to consider.

<div align="center">**Discussion**</div>

EMDR has been found to be effective at treating PTSD (Chen et al., 2015; Cusack et al.,

2016; Wilson et al., 2018). CBT and its various forms, like ET, have also been found to be

equally effective at treating PTSD in clients (Cusack et al., 2016). CBT-based interventions like

TF-CBT have the most evidence for their efficacy, and this evidence is of stronger quality than other treatments (Cusack et al. 2016). CBT-based interventions maintain gains at LTFU, showing that the improvements from treatment last, giving clients better long-term outcomes (De Bont et al., 2016; Rothbaum, Astin, & Marsteller, 2005). CBT-based interventions have been shown to reduce PTSD symptoms with clients that have other comorbid disorders (De Bont et al., 2016). CBT-based interventions have strong and ample evidence that they also help significantly reduce PTSD symptoms in adolescents and children (Morina et al., 2016). CBT-based interventions for PTSD also have more evidence of stronger quality (Cusack et al., 2016) for being efficacious in the treatment of PTSD across a variety of populations.

EMDR was sometimes found to be marginally better at decreasing some PTSD symptoms (arousal and severity of intrusion) than CBT-based interventions (Chen et al., 2015). EMDR was also found to be less effective than CBT-based interventions in the treatment of PTSD in children and has substantially less evidence (Morina et al., 2016). Both CBT and EMDR were found to be effective at relieving PTSD symptoms in clients with comorbid disorders, but CBT-based interventions were more likely to have the primary diagnosis in remission at a long-term follow-up (De Bont et al., 2016). EMDR and CBT (especially ET and EMDR) are very similar treatments, with the biggest differentiating component being the use of EMs in EMDR. Review of the EM component indicates that what precisely the EMs bring to EMDR is unclear, with some correlations between EMs and PTSD-related brain structures being demonstrated (Rimini et al., 2016). The highest quality evidence suggests that the EMs may be superfluous to treatment outcomes (Davidson & Parker, 2001). Furthermore, EMDR not maintaining its gains compared to CBT-based treatments at LTFUs may be due to the EMs reducing intensity of exposure and thus lowering habitation effects to the traumatic stimuli. The

mechanisms of action in EMDR remains contentious and unclear, with higher quality evidence needed.

Research has shown (Kline et al., 2018) that ET and CBT alone are more effective than EMDR at treating PTSD. Studies showing that EMDR performs better than CBT compare EMDR to a wide variety of CBT-based treatments. CBT and ET have the largest amount and strongest evidence of all treatments for PTSD (Cusack et al., 2016). Considering the significant similarities between CBT, ET, and EMDR, and the lack of explanation for the mechanisms behind EMDR, using CBT or ET is the more prudent choice. CBT and ET have more robust evidence and have been demonstrated to work in more populations, more efficaciously, than EMDR.

EMDR training requires additional fees and time investment to obtain certification before administering that CBT and ET do not require. This potentially makes ET and CBT easier and cheaper to administer for clinicians. Cost to clients will vary depending on available providers, but the similar amount of sessions for each treatment means that costs should be similar. The impact of these factors will vary from clinician to clinician, and this should be considered on an individual basis when determining whether pursuing EMDR is worth it. There is significant evidence for EMDR being more efficacious than no treatment, and not causing harm to PTSD clients (Chen et al., 2014). Some analyses (Chen et al., 2015; Kline et al., 2018) found that EMDR was more efficacious than various forms of CBT at reducing PTSD and anxiety symptoms. The high heterogeneity of these comparisons limit conclusions that can be drawn. With the highest quality evidence showing that CBT, ET, and EMDR all perform relatively similar in these domains.

Limitations of Study

This review was limited to only RCTs as it was primarily interested in the theory and mechanisms of EMDR and differentiating EMDR from ET and CBT-based interventions. This is a limitation as this study did not review EMDR, ET, or CBT-based interventions in clinical settings. This review also produced no new statistical calculations and was conducted by one person, further limiting its scope.

Suggestions for Future Research

More direct investigation of the role of EMs in EMDR is needed in order to better understand the mechanisms behind EMDR. Direct comparisons of EMDR with and without EMs to ET could provide more insight into the mechanisms behind EMDR. More direct comparisons of EMDR to ET and CBT-based interventions with higher methodological rigor, across multiple client populations would help shed more light on the appropriate uses of each treatment. Overall, more high quality comparisons of EMDR with and without EMs, and higher quality comparisons of EMDR to ET and CBT-based interventions are needed to draw stronger conclusions.

Conclusions

Ultimately, clinicians should probably be hesitant to invest in EMDR training. Competing trauma treatments like ET and TF-CBT have been demonstrated to be efficacious in the treatment of PTSD, with more evidence of greater quality than EMDR. The unclear mechanism behind EMDR, and the low quality of its evidence, make it difficult for a clinician to fully understand EMDR and apply it in a clinical setting. EMDR is also very similar to ET, with the largest differentiating component being the EMs found in EMDR. The highest quality evidence suggests that EMs are superfluous to treatment outcomes. This suggests that clinicians would be spending extra resources to learn a treatment that is not significantly different and has

worse supporting evidence. All of these factors make it difficult to choose to administer EMDR

over CBT or ET. While EMDR has been shown to be effective in treating PTSD these lingering

concerns around its theory, mechanisms of action, cost, and quality of evidence makes ET or

CBT-based interventions a sounder decision for clinicians. Limited resources and limited time

with clients make choosing the most cost-effective, proven, and efficacious treatment a high

priority for many clinicians. CBT and ET outperform EMDR in all of these domains. This makes

CBT and ET better treatments for the majority of clinicians to administer.

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