

The Use of Eye Movement Desensitization and Reprocessing in treating Post-traumatic Stress Disorder

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Abstract

This literature review examines previous research that assesses the therapeutic benefits of Eye Movement Desensitization and Reprocessing (EMDR) in individuals with Post-traumatic Stress Disorder (PTSD). EMDR provides an alternative treatment option for individuals with PTSD, who could experience additional psychological challenges with other treatment methods. This investigation synthesizes the results from previous literature reviews, practitioner reports, case studies, and experimental studies, in order to examine the possible therapeutic benefit of EMDR for clients with PTSD. The individuals mentioned in this study include children who have been exposed to natural disasters or violence, refugees, survivors of sexual assault, combat veterans, and individuals who have been previously diagnosed with another disorder in addition to their diagnosis of PTSD. Ultimately, the goal of this review is to stimulate further investigation into the merits of EMDR for a wide range of individuals who suffer from PTSD.

Key Words:

Eye Movement Desensitization and Reprocessing, EMDR, PTSD

Post-traumatic Stress Disorder (PTSD) is the inability to sufficiently process anxiety provoking thoughts and emotions, which occur after a traumatic event, leading to cognitive distress and maladaptive behaviors (American Psychiatric Association, 2013). Symptoms of PTSD often manifest as the avoidance of triggering stimuli, hyperarousal (Taylor et al., 2003), intrusive thoughts or flashbacks, as well as feelings of guilt, shame and self-loathing (American Psychiatric Association, 2013; Power et al., 2002). Individuals with PTSD also have an increased likelihood of developing depression and anxiety, as well as maladaptive and harmful behaviors, such as substance abuse, isolation, and self-injurious behavior (Kitchiner, 2004; Korn & Leeds, 2002). The extreme nature of post-traumatic symptomatology highlights the importance of

finding effective psychological interventions for this disorder.

Francine Shapiro developed Eye Movement Desensitization and Reprocessing (EMDR) in 1989, to serve as an alternative treatment method for PTSD (de Jongh & ten Broeke, 1998). The standard EMDR procedure is comprised of eight phases, which focus on emotionally distancing the client from the triggering aspects of the psychologically distressing memory, using bilateral stimulation (Lee, Taylor, & Drummond, 2006; Russell, 2006; Silver et al., 2008; Lee, Taylor, & Drummond, 2006). Bilateral stimulation is used to help deaden the overwhelmingly negative aspects of the traumatic experience. Throughout the course of treatment, the therapist and client work together to replace the client's negative cognitions associated

with the traumatic experience with more adaptive thoughts that instill a more positive sense of self-worth in the client (Silver et al., 2008). The client is then asked to identify any lingering somatic symptoms of their previous anxious state (i.e., clenched fists, tense shoulders etc.), and focuses on relaxing those parts of the body, using additional bilateral stimulations. Treatment sessions conclude with enough time to allow the client to voice potential concerns and provide a time for the therapist to suggest possible coping skills for the client to utilize in the future.

This literature review examines the possible benefits of EMDR for individuals with who have developed PTSD as a result of various traumatic experiences, including children who have been exposed to natural disasters or violence, refugees who have undergone traumatic experience in their home countries and victims of sexual assault. This review also examines the use of EMDR for soldiers and combat veterans, as well as for individuals who have been previously diagnosed with other psychological disorder in addition to PTSD.

Effects of EMDR on Specific Populations

PTSD in Children

Unlike their adult counterparts, many children are less able to express, or even understand, their negative cognitions and emotions associated with traumatic experiences (Adúriz, Bluthgen, & Knopfler, 2009). As a result, children in these situations are at greater risk of developing PTSD, depression and anxiety (Ahmad, Larsson, & Sundelin-Wahlsten, 2007), as well as a number of other psycho-emotional difficulties. This is thought to be due, in part, to the developing logic patterns of children, who often interpret these events differently than adults would (Ahmad et al., 2007; Wadaa, Zaharim, & Alqashan, 2010). These cognitive differences could also result in children responding to psychological treatment differently than they would in adulthood. Regardless, traumatic experiences in childhood, arguably, have a more life-altering impact on children than they do on adults (Park, Park, Lee & Chang, 2012), meaning that the need to create time-efficient treatments for childhood PTSD is all the more essential.

Traumatic experiences caused by natural disasters.

For children who survive a major natural disaster, the abrupt displacement of the child's family, along with the persisting sense of uncertainty, can be particularly distressing. Adúriz et al. (2009) employed a group-therapy version of EMDR with children who had been traumatized after witnessing a massive flood in their hometown in Argentina. The participants, aged 7 to 17, were asked to draw their memories of the flood, which served as a vehicle for communication for describing their experience. After each drawing was complete, clinicians prompted participants to self-administer bilateral stimulation in the form of the Butterfly Hug, which is a tactile form of bilateral stimulation predominantly used with children. This process was repeated until there was a reduction in the child's negative cognitions, which were then replaced with more positive sentiments. Ultimately, Adúriz et al. (2009) found that at the 3-month follow-up, 75% of participants no longer held a diagnosis of PTSD.

A similar study compared the effects of EMDR to those of psychoeducation on adolescents who had been traumatized after Typhoon Morakot devastated their hometown, forcing a majority of the participants to relocate (Tang, Yang, Yen & Liu, 2015). Many participants exhibited symptomology consistent with PTSD major depressive disorder (MDD), and anxiety, which manifested in thoughts of suicidality in certain participants. Tang et al. (2015) found that while EMDR was superior to psychoeducation in decreasing levels of depression and anxiety in participants, it had no significant effect on symptoms of PTSD.

The differences in the results generated by Adúriz et al. (2009) and Tang et al. (2015) could stem from various factors. While both studies experienced challenges related to negative cultural perceptions of psychological intervention, Adúriz et al. (2009) made a concerted effort to incorporate community involvement in the treatment process, which arguably made the positive impact of treatment more sustainable. Moreover, throughout the intervention phase participants in the Tang et al. (2015) study continued to live in close proximity to the devastation caused by the typhoon, which

served as a constant visual reminder of their traumatic experience. Ultimately, the outcome from these studies indicate that psychological treatment does not exist in a vacuum, meaning that environmental factors can serve to either enhance or hinder the overall effectiveness of EMDR.

Traumatic experiences caused by exposure to violence.

Children who experience or witness violence and/or abuse are at an increased risk of developing PTSD, which creates the need for psychological intervention, and thus EMDR. In a study of 14 Iranian girls who had all been subjected to some form of sexual abuse, Jaberghaderi et al. (2004) compared the effectiveness of EMDR and CBT in helping participants cope with their emotional and cognitive distress. Similarly, to Adúriz et al. (2009), Jaberghaderi et al. (2004) actively involved parents and families of the abused children into the treatment process in order to counteract potential cultural stigma towards both psychological interventions, as well as negative cultural views towards girls who had been sexually abused. After 10 sessions, Jaberghaderi et al. (2004) found that while both therapeutic models were effective, EMDR was more successful than CBT in lessening symptoms of PTSD.

Zaghrou-Hodali, Alissa and Dodgson (2008) carried out a similar intervention by administering EMDR to children who had all witnessed a shooting near their home in Palestine. The main goal of EMDR treatment focused on the reduction of symptoms related to PTSD, anxiety and depression. Another major goal of this study was to help increase participant resilience, which was deemed prudent, due to the unstable, and often violent, socio-political environment of many participants. Zaghrou-Hodali et al. (2008) also utilized the Butterfly Hug form of bilateral stimulation, and after four EMDR sessions, the seven participants exhibited reduced post-traumatic symptomatology, as well as increased levels of resiliency. Participants' increased resiliency was confirmed when soldiers forcibly stormed several of the children's homes, and those children did not demonstrate significant relapse in post-traumatic symptomatology.

There are several key components that influence the success of EMDR in these studies. Specific environmental factors can serve to promote or combat any psychological improvement caused by EMDR. For instance, the stable home environments of the participants in Zaghrou-Hodali et al.'s (2008) study likely supported the reduction of post-traumatic symptomatology, as well as participants' increased emotional resiliency. Both Adúriz et al. (2009) and Zaghrou-Hodali et al. (2008) viewed parent involvement as a positive, external factor that supports the psychological improvement made by EMDR. Ultimately, these results are promising, but the inconsistent success of EMDR with children warrants further investigation.

PTSD experienced by refugees and asylum seekers

For the 65 million refugees and asylum seekers worldwide, potentially traumatizing events do not end after they have fled their home country (Acarturk, Konuk, Cetinkaya, Senay, Sijbrandij, Gulen, & Cuijpers, 2016; Domonske, 2016). Escaping genocides, civil wars, and various forms of social persecution, many refugees come into countries where they cannot speak the language, are unable to get a job, and face discrimination by citizens of their host country (Acarturk et al., 2015; Acarturk et al., 2016).

Acarturk et al. (2015) investigated the use of EMDR on individuals with PTSD who were living in a refugee camp in Turkey at the time of the study. All participants had recently witnessed death, torture and/or serious injury, as well as a number of other war related atrocities. Despite the lack of formal diagnoses of participants and the low levels of certification of both psychologists, the results of this examination were promising. Participants in the EMDR condition demonstrated significant improvement, compared to waitlist control, on measures of depression, anxiety, and PTSD symptomology. Acarturk et al. (2016) found similar results in the use of EMDR on adult refugees who were also living in a refugee camp; this study differed slightly on measures of success as well as more rigid inclusion criteria of participants, but ultimately found similar levels of effectiveness as the aforementioned study. The implications of both

studies suggest that EMDR is not only effective in chaotic and turbulent environments, but also is effective shortly after the traumatic event, or series of events, has occurred.

While the findings of Acarturk et al. (2015) and Acarturk et al. (2016) are promising, environmental factors have also been shown to negatively impact success rates of EMDR with refugees. Ter Heide, Mooren, Kleijn, de Jongh, & Kleber (2011) compared the benefits of EMDR to those of trauma focused cognitive behavioral therapy (TF-CBT) for adult refugees seeking asylum in the Netherlands. Despite rigorous sampling procedures, ter Heide et al. (2011) experienced a number of difficulties with their participants including challenges related to language barriers, as well as the highly complex post-traumatic symptomatology of participants. As a result, neither EMDR nor TF-CBT demonstrated any significant improvement in participants' PTSD symptomatology.

Ter Heide et al. (2011) argue that regardless of how effective a particular treatment, providing therapy too soon after a traumatic experience often does not lead to significant psychological improvement. However, both Acarturk et al. (2015) and Acarturk et al. (2016) administered EMDR to refugees who had experienced traumatic events far more recently than participants in the Ter Heide et al. (2011) study and managed to achieve greater levels of success at reducing participants' post-traumatic symptomatology. The difficulties related to language barriers in the Ter Heide et al. (2011) study could have contributed to participants' low levels of success with EMDR, but more research is needed to investigate these effects further.

Effects of EMDR on Specific Traumatic Experiences

PTSD caused by Sexual Assault/Molestation

PTSD caused by sexual assault can leave the survivor with feelings of overwhelming fear, depression, worthlessness, and shame. Moreover, societal views of people, namely women, who have been sexually violated can have a tremendous impact on how individuals cope (Jaberghaderi, Greenwald, Rubin, Zand, & Dolatabadi 2004).

Furthermore, psychological intervention has the potential to be overwhelming, due to how these treatments force the victim to relive their traumatic experience (Rothbaum, 1997). EMDR's focus, however, lies not within the traumatic memories themselves, but rather the thoughts and emotions that accompany them. Especially for a client with these experiences, EMDR's goal is to replace their negative feelings, with feelings of perseverance and strength at having had survived such an ordeal.

Rothbaum, Astin and Marsteller (2005) compared the benefits of EMDR to those of traditional exposure therapy (ET) in female survivors of sexual assault over the age of twelve. While similar studies have compared EMDR to various non-exposure therapies (i.e., CBT, relaxation training etc.), in the comparison of EMDR to ET, Rothbaum et al., (2005) examines two therapies that use similar processes to tackle the traumatic memory (Jaberghaderi et al., 2004; de Roos, Greenwald, den Hollander-Gijsman, Noorthoorn, van Buuren, & De Jongh, 2011; Seidler, & Wagner, 2006). While utilizing 90% of the original procedures, both treatment conditions outperformed control at lessening participants' symptoms of anxiety, depression, and PTSD, over the course of nine weeks. Prolonged exposure was found to be slightly more effective than EMDR, although neither treatment form performed better on levels of anxiety and depression. The exact reason for the increased benefit of traditional exposure therapy compared to EMDR remains unclear. However, this study demonstrates the advantages of both interventions, while also comparing EMDR to a therapy with a similar therapeutic perspective.

Furthermore, EMDR's high levels of effectiveness over relatively short treatment periods also demonstrate a positive effect on individuals whose sexual assault happened years in the past (Edmond, Rubin & Wambach, 1999). People who have struggled for years to process memories of their sexual assault often experience resistance to psychological treatment and often are reluctant to discuss related issues (Rothbaum et al., 2005). Edmond et al. (1999) studied both the speed of recovery and the overall level of effectiveness of EMDR in treating symptoms PTSD, depression and anxiety, in women who had been sexual assaulted

as children. Using a variety of measures, including the Beck Depression Inventory (BDI) and State-Trait Anxiety Inventory (STAI), Edmond et al. (1999) compared EMDR to a wait-list control group over the course of six sessions. Participants in the EMDR condition had significantly lower scores on the BDI at post-treatment, which continued to improve throughout the follow-up period. Similar trends were found on participants' STAI scores. Ultimately, this study indicated that EMDR was successful in decreasing negative and maladaptive cognitions associated with the distressing memory, while simultaneously replacing them with more positive and adaptive ones.

PTSD in Soldiers from Combat Experiences

Even after the threat of immediate danger has passed, many war veterans struggle to cope with the atrocities they witnessed in combat. Soldiers are often at a greater risk of developing more complex post-traumatic stress symptomatology, due to feelings of overwhelming guilt associated with the trauma, such as survivor's guilt or the feeling of having been able to do more to help the situation (Russell, 2006). Many of these individuals also undergo prolonged periods without receiving treatment, possibly caused by environmental factors or an unwillingness to discuss the negative emotions associated with their experiences (Silver, Brooks & Obenchain, 1995; Silver et al., 2008).

EMDR with Iraqi War veterans.

Examining soldiers who had just returned from combat, Russell (2006) administered EMDR on Iraqi War veterans had recently arrived at a field hospital in Spain. The average length of stay ranged from one to three days, making time efficient psychological treatments invaluable to staff. Through the application of EMDR, all four veterans were able to significantly reduce their feelings of overwhelming emotional distress related to their traumatic experiences. The key exception was a soldier labeled only as "P2," who displayed more complex symptomatology, along with feelings of survivor's guilt associated with his triggering experiences, meaning that he did not show as much improvement as the other participants. While this setting is not ideal, EMDR still facilitated

significant improvement in lowering participants' complex post-traumatic symptoms in one to three days and provides a basis for additional research.

In a further examination on the possible benefit of EMDR with war veterans, Silver et al. (2008) suggests that the free association aspect of desensitization and reprocessing phases of EMDR are especially helpful for war veterans, due to the vivid sensory nature of their combat experiences. Similarly to Russell (2006), Silver et al. (2008) argue that while CBT or exposure therapy have documented validity, both methods can inadvertently traumatize the client further by forcing him or her to relive that experience. These assumptions were tested in a 22-year old Iraqi War veteran, who, after his recent termination from the United States Army, exhibited increasing levels of depression and isolation associated with his diagnosis of PTSD (Silver et al., 2008). Over the course of treatment, the participant revealed that he suffered from periods of intrusive thoughts and nightmares, as well as a chronically low view of himself. However, after four EMDR sessions, the participant showed significantly lower levels of emotional distress, as well as increased socialization and the ability to discuss his experiences with those closest to him, which all remained consistent at the 3-month follow-up.

EMDR with Vietnam War veterans.

Studies have also been done on veterans whose traumatic experiences have been left untreated for decades, which can then further complicate an individual's post-traumatic symptomatology (Silver et al., 1995). Silver et al. (2008) examined a Vietnam War veteran who experienced a resurgence of PTSD-like symptoms with the commencement of the war in Iraq in 2003. This relapse manifested in uncontrollable tremors throughout his body, causing researchers to primarily focus on his own memories from combat, as well as on the emotional disturbances that returned after the recent conflicts in the Middle East. Correspondingly, Silver et al. (1995) compared the effects of EMDR to relaxation training on Vietnam War veterans who were still struggling with their PTSD from their time in the military. Ultimately, EMDR demonstrated success at decreasing the intensity of post-traumatic

symptomatology, specifically in reducing re-experiencing and somatic symptoms (Russell, 2006; Silver et al., 1995; Silver et al., 2008), providing support for the use of EMDR in recent, as well as latent combat-related memories.

Implications

While the overall administration of EMDR does not change based on the traumatizing event that brought a person to therapy, clinicians should be cognizant of the specific personal and societal factors that could influence treatment. (i.e., internalized feelings of shame and self-loathing in survivors of sexual assault, and various somatic symptoms often present in war veterans with PTSD) (Jaberghaderi et al., 2004; Silver et al., 1995; Silver et al., 2008). By doing so, clinicians are able to best utilize key aspects of EMDR intervention (i.e., desensitization and installation phases), to benefit clients PTSD. Furthermore, while additional research is needed on EMDR's effectiveness with these populations, the results generated by the aforementioned advocate for EMDR's effectiveness and versatility.

Effects of EMDR with Comorbid/Complex Disorders

Dual Diagnosis of PTSD with Another Disorder

Levels of depression and anxiety are common in individuals who suffer from PTSD (Korn & Leeds, 2002; Tang et al., 2015), and are therefore measured extensively in many psychological studies. However, other psychological disorders have not only been overlooked in this area of research, but also often serve as exclusion criteria for studies examining PTSD (de Bont, van Minnen, & de Jongh, 2013). To combat this, researchers have begun to examine the benefits of EMDR on individuals with a diagnosis of PTSD, and another psychological disorder (i.e., borderline personality disorder, psychosis or intellectual disability) (de Bont et al., 2013; Gilderthorp, 2015; Korn & Leeds, 2002; Korn, 2009; Mevissen, Lievegoed, Seubert & de Jongh, 2012; Taylor et al., 2003).

PTSD and borderline personality disorder.

Korn and Leeds (2002) coined the term "post-traumatic personality" to describe the comorbid

disorder of PTSD and borderline personality disorder. Individuals with post-traumatic personality typically show high levels of abuse in childhood, specifically sexual abuse, which can complicate their psychopathology even further, causing many researchers to be wary of including them in studies (Korn & Leeds, 2002; van der Vleigel, van den Berg & Staring, 2012). However, Korn and Leeds (2002) found that adding Resource Development Installation (RDI) to the installation phase of the standard EMDR treatment improved participants' symptoms. Essentially, RDI builds upon the processes that are already in place in the standard EMDR procedure, with a specific focus on strengthening the client's ego. While establishing more positive cognitions during the installation phase of EMDR, RDI requires the client to focus both on the positive cognitions themselves, and on the reasons why those thoughts are valid and believable. Korn and Leeds (2002) found that adding RDI helped lower participants' levels of depression, anxiety, anger, and self-injurious behavior, as well as lessening symptoms of PTSD.

PTSD and psychosis

Similarly, the comorbidity between PTSD and psychosis is estimated to be extremely high, with evidence showing that individuals who have experienced some form of trauma are at a much greater risk of developing psychosis, especially if the traumatic experience was prolonged or occurred in childhood (de Bont et al., 2013; de Bont, van den Berg et al., 2016; van der Veigel et al., 2012). De Bont et al. (2013) compared the effects of prolonged exposure therapy (PE) and EMDR on individuals who had been diagnosed with both PTSD and psychosis. Over the course of 12 sessions, both treatments had similar levels of success, with participants in both conditions showed lower levels of psychosis, and a majority no longer met diagnostic criteria for PTSD at post-treatment.

De Bont et al. (2016) and van den Berg et al. (2015) conducted similar studies that compared the benefits of PE to EMDR on individuals with both psychosis and PTSD. While van den Berg et al. (2015) found almost no therapeutic advantage of either of the two therapies, over the course of 8 sessions, de Bont et al. (2016) found that participants in the EMDR

condition exhibited less severe auditory hallucinations at post-test and follow-up, compared to those in the PE and control conditions. While both EMDR and PE are effective in treating PTSD in individuals with various psychoses, more research is needed to determine which is the superior treatment across various psychological measures.

PTSD and intellectual disabilities

Individuals with intellectual disabilities (ID) are not only capable of developing PTSD, but also could be more susceptible to PTSD, due to an impaired ability to cope with complex emotions and cognitions (Gilderthorp, 2015; Mevissen, Lievegoed & de Jongh, 2011). Individuals with ID frequently display less recognizable and less measurable psychological symptoms than their typically developing counterparts, making research with this population relatively scarce. However, a meta-analysis conducted by Gilderthorp (2015), included four case studies that each investigated the use of EMDR on individuals with both PTSD and a form of ID, including autism spectrum disorder (ASD), developmental disabilities and bipolar disorder. Gilderthorp (2015) found that EMDR was more effective in participants whose ID was categorized as mild or moderate, and individuals with more severe ID experienced more complications and had less success with EMDR. Alternatively, Mevissen et al. (2012) found success with EMDR on individuals with a dual diagnosis of a severe intellectual disability and PTSD; these results remained constant at follow-up periods and suggest that more research is needed in order to obtain a definitive understanding of how individuals with intellectual disabilities respond to EMDR.

Implications

Examining the possible therapeutic benefits of EMDR with individuals diagnosed with a wide range of comorbid disorders provides a research base for individuals who until recently had a more limited selection of possible treatment options for their post-traumatic symptomatology. A majority of the participants in these samples experienced positive results with EMDR, regardless of their second diagnosis, indicating that this could be a

promising area in EMDR research (de Bont et al., 2016; Gilderthorp, 2015; Korn, 2009; Mevissen et al., 2012).

Conclusion

EMDR has exhibited a wide range of benefit and versatility. Children exposed to natural disasters and forms of violence have reacted positively to EMDR treatment (Adúriz et al., 2009; Jaberghaderi et al., 2004; Zaghrou-Hodali et al., 2008), with exceptions often citing environmental conflicts or theorized neurological differences of children (Tang et al., 2015; Wadaa et al., 2010). Studies investigating the use of EMDR on refugees also reported significant symptom reduction (Acarturk et al., 2015; Acarturk et al., 2016). Moreover, survivors of sexual violence have shown improvement in levels of depression, anxiety and PTSD after EMDR (Edmond et al., 1999; Jaberghaderi et al., 2004; Rothbaum et al., 2005), with the installation and desensitization phases of treatment being especially beneficial. Similar supporting evidence for EMDR was found for combat veterans for both veterans whose traumatic experiences were more recent (Russell, 2006), as well as those whose memories are decades old (Silver et al., 1995; Silver et al., 2008). Lastly, EMDR has helped improved the PTSD symptomology in individuals with more than one psychological diagnosis (de Bont et al., 2013; Gilderthorp, 2015; Korn & Leeds, 2002; Korn, 2009; Mevissen et al., 2012; Taylor et al., 2003). Ultimately, these studies provide evidence for the clinical benefits of EMDR and provide a foundation for future research.

However, there is evidence to suggest that traditional ET may provide equal, or greater, therapeutic benefit to those struggling with PTSD, compared to EMDR (van den Berg et al., 2015; Davidson & Parker, 2001; Lee, Gavriel, Drummond, Richards, & Greenwald, 2002; Rothbaum et al., 2005; Taylor et al., 2003). The probable root of these similar levels of effectiveness stem from how both treatments utilize exposure techniques to help clients overcome traumatic experiences, meaning that central aspects of their procedures share similarities. The ultimate goal of this review is not to convince researchers that

EMDR is a superior method of treatment for PTSD, rather than EMDR's documented levels of effectiveness versatility warrant further examination.

Limitations

A number of studies in this review had fewer than 20 participants (Albright & Thyer, 2010; Maxfield & Hyer, 2002; Oras et al., 2004; Ribchester, Yule & Duncan, 2010; Spence et al., 2013; Zaghrou-Hodali et al., 2008), which limits the generalizability and power of their results. Furthermore, much of the support for EMDR's efficacy stems from anecdotal and isolated incidences, including practitioner reports, case studies, and studies without a control group (Adúriz et al., 2009; Ehntholt & Yule, 2006; Kitchiner, 2004; Russell, 2006; Silver et al., 2008). Several studies also had specific environmental limitations that made a formal diagnosis of PTSD impossible, which could have an impact on the data outcomes (Acarturk et al., 2015; Kitchiner, 2004; Wadaa et al., 2010).

The relatively unknown mechanisms of action behind bilateral stimulation can also present obstacles for researchers (van den Hout, Mooren, Kleijn, de Jongh & Kleber, 2012; Jeffries et al., 2012; Lee et al., 2006; P. Mackey, 2016; McGuire, Lee & Drummond, 2012; Rothbaum et al., 2005; Seidler et al., 2006; Sack et al., 2016). Whether its benefit lies in the replication of REM sleep or in the divided attention of the client, more research is needed to understand these processes. Maxfield and Hyer (2002) propose the utilization of a higher methodological standard in EMDR research studies has led to better treatment outcomes of participants, which could potentially translate to the clinical level. Shapiro (2002) also stresses the importance of psychologists being properly trained in standard EMDR procedure, which has not always been present in investigations of the effectiveness of EMDR (Acarturk et al., 2015; Maxfield & Hyer, 2002).

Furthermore, several studies involving children exhibited somewhat dubious results, with researchers questioning if the children were able to understand, and thus benefit from EMDR (Ahmad et al., 2007; Ahmad & Sundelin-Wahlsten, 2008;

Wadaa et al., 2010). Researchers in these studies questioned both whether the children were able to understand the procedure, and if the child-modified versions obtained significant levels of effectiveness. These findings highlight a deficiency in current research, which need to be supplemented by future research into the benefits of EMDR with different populations.

Directions for future research

Prospective areas for future EMDR research would expand on the findings from previous studies, in order to better understand the full benefits and mechanisms of action of this treatment (Ahmad et al., 2007; Ahmad et al., 2008, Oras, Ezpelata & Ahmad, 2004). Additionally, with the technological advances in other facets of psychology rapidly expanding, Internet delivered EMDR (iEMDR) has demonstrated levels of merit (Spence et al., 2013). This method of administration for EMDR could help individuals in remote areas, or areas where there are no local clinicians who are trained EMDR. More research is needed to investigate the possible benefits, or challenges associated with iEMDR.

Alternatively, with the development of neuroimaging and neuropsychological instruments, researchers can further the neurobiological benefits of EMDR (Nardo et al., 2009; Lansing, Amen, Hanks & Rudy, 2005; Park et al., 2012). A meta-analysis conducted by Jeffries et al. (2012) concluded that while there is no definitive reason for the effectiveness of bilateral stimulation, the positive responses from participants warranted future research.

Knowledge of these processes could also lead to EMDR's application in other areas of psychological treatment including depression and anxiety, in which EMDR has already demonstrated clinical success (Edmond et al., 1999; Ehntholt & Yule, 2006; Korn & Leeds, 2002; Oras et al., 2004). Other areas for potential therapeutic growth for EMDR include treatment for substance abuse and addiction, individuals with various forms of psychosis, epilepsy and other seizure disorders, and countless other psychological impairments (Abel & O'Brien, 2010; van der Berg et al., 2015; de Bont et al., 2013; de Bont et al., 2016; Chemali & Meadows,

2004; Korn et al., 2002; Schneider, Nabavi & Heuft, 2005). Further examination is needed to better understand the possible therapeutic benefits of EMDR in treating a wider range of psychological disorders. Results from these studies could not only highlight additional treatment options for other psychological concerns, but also help researchers better understand the exact mechanisms that make EMDR an effective treatment.

Ultimately, the support of EMDR research is noteworthy, especially when considering how relatively young this treatment is, and lays a solid foundation for its application in individuals with PTSD. Future research is essential, not only to discover the exact processes that makes this treatment so effective and time efficient, but also to unveil its potential for other psychological disturbance

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