



An Overview of Eye Movement Desensitization and Reprocessing

Eye movement desensitization and reprocessing (EMDR) is a typically eight phased psychological treatment based on the adaptive information processing model. While the exact mechanism(s) of action have not been established yet there are many theories on how EMDR works, e.g., via enhancing interhemispheric connectivity, imitation of rapid eye movement sleep, taxation of the working memory, or neural integration and thalamic binding. Nowadays the therapy is not only utilized in the face-to-face approach, but also remotely and via virtual reality applications. EMDR is typically associated with trauma treatment, however, its versatility allows for utilization in other domains such as anxiety, depression, psychosis, substance abuse and pain disorders, either as an add-on or as first line treatment. Furthermore, EMDR has been shown to be interculturally successful. Since its origination more and more specialized protocols are being developed to address the individual needs within and beyond trauma patient groups. Currently, research on superiority/inferiority of EMDR compared to other treatment approaches paints a mixed picture.

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What is Eye Movement Desensitization and Reprocessing?

Eye movement desensitization and reprocessing (EMDR) is an integrative humanistic therapy approach focusing on the patient's internal resources to overcome trauma and other psychopathology rooted in prior experiences (Oren & Solomon, 2012). It follows an eight-phase protocol focusing on the past, present, and future over approximately six to twelve sessions (American Psychological Association, 2017a). Special about this approach is its utilization of bilateral stimulation (Oren & Solomon, 2012).

The therapeutic approach was born out of an observation made by Francine Shapiro while taking a walk in a park. When she engaged in bilateral eye movements (BEMs) it seemed to reduce the disturbing thoughts she was having. This observation sparked further investigation into whether BEMs would have the same effect on others (Oren & Solomon, 2012). After discovering that others seem to experience similar benefits, the development of EMDR was set into motion (Oren & Solomon, 2012). Nowadays, EMDR has become one of the American psychology association's (APA, 2017) recommended treatments for posttraumatic stress syndrome (PTSD).

This overview will discuss the theoretical basis of EMDR, its standard protocol, potential mechanisms of action, alternatives of face-to-face EMDR, EMDR beyond PTSD, applicability across different cultures, alternative protocols, and compare EMDR to other interventions. Finally, conclusions will be drawn.

Theoretical Basis of EMDR

EMDR is largely based on the adaptive information processing (AIP) model (Hase, 2021). According to this model memory networks store information about prior experiences that then contribute to the formation of adaptive reactional templates (Oren & Solomon, 2012). However, certain experiences are suggested to be too distressing to be properly integrated

into the network (Oren & Solomon, 2012). Accordingly, pathology is said to originate from memories being inadequately processed and stored in isolation, where they remain in an excitatory state-specific form (Hase et al, 2017). These memories have been termed 'pathogenic memories' (Hase et al., 2017). When something triggers such a pathogenic memory, the individual has no adaptive template on hand and reacts maladaptively (Oren & Solomon, 2012).

EMDR seeks to rectify this inadequate storage of each memory, systematically reprocess them, and link them to adaptive information with the help of bilateral stimulation (Oren & Solomon, 2012). Therefore, previously distressing experiences may become a resource for more adaptive reactions in the future (Hase, 2021).

EMDR Protocol

It is important to mention that before reprocessing memories the patient needs to be sufficiently resourced (Hase, 2021). Korn and Leeds (2002) suggest that prior to addressing trauma directly, it is beneficial for patients to be grounded affectively regulated, and behaviorally stable. Once this has been established, the eight phased EMDR protocol can be introduced. Its focus is on past experiences, present triggers, and future templates, hence why it is described as three-pronged (Hase, 2021).

The first phase is dedicated to the case conceptualization and development of a treatment plan (Hase, 2021). The therapist concentrates on the patient's strengths and difficulties, past events connected to the present problems, current triggers, and goals for the future (Oren & Solomon, 2012). In phase two, to process memories safely, the patient is being prepared via psychoeducation on their complaints and EMDR. Furthermore, they receive resource interventions such as techniques to calm themselves down (Oren & Solomon, 2012). The assessment phase (phase three) focusses on the patient's target memory. This entails the related negative cognitions, desired positive cognition, and current sensations and emotions (Oren & Solomon, 2012). Desensitization (phase four) entails systematic exploration of memories related to the event that the pathology originated from. Furthermore, the clinician employs alteration of sensory, cognitive, emotional, and somatic information. During this phase, the focus lays on making the memory more tolerable

and enabling a new view of the self and the world (Oren & Solomon, 2012). Phase five involves installing more positive cognitions about the self in relation to the event (Oren & Solomon, 2012). The body scan (phase six) involves identification and processing of physical sensations aiming to completely alleviate them (Oren & Solomon, 2012). During closure (phase seven) the therapist reflects on the sessions progress and prepares the patient for what comes next, it may also include stabilization techniques before ending the session (Oren & Solomon, 2012). Reevaluation (phase eight) takes place during the start of the next session and concentrates on evaluating the patient's response to treatment and what happened since the last session (Oren & Solomon, 2012).

There are several variations of this protocol that are fitted to specific patient populations. For instance, fragile patients with complex trauma may be treated with the inverted version of the standard protocol (Hase, 2021). Further adaptations such as the phobia protocol, emergency room and wards protocol, integrative treatment protocol, etc. can be found in Shapiro's (2018) book on EMDR therapy.

EMDR Mechanisms

In accordance with the AIP model, suggested mechanisms revolve around the isolated memory fragment at the root of the pathology being connected to the larger memory network, something Oren and Solomon (2012) called assimilation of adaptive information. A proposed mechanism of establishing a connection to that memory fragment is reconsolidation which describes the process of the memory becoming malleable and solidifying it in an adjusted, more adaptive manner (Oren & Solomon, 2012).

The driving factor for several of the theories trying to explain the working mechanisms of EMDR is bilateral stimulation (e.g., Bergmann, 2008; Landin-Romero et al., 2018). Therefore, we will start with an elaboration on bilateral stimulation itself. Then, the following sections will introduce four theories on EMDR's working mechanisms (interhemispheric connectivity hypothesis, rapid eye movement sleep hypothesis, working memory model, and neural integration and thalamic binding model). Lastly, a small concluding statement will be given.

Bilateral Stimulation

There are several modes of bilateral stimulation, i.e., BEM, audio stimulation, and tactile stimulation, the latter will be the first point of attention. Amano and Toichi (2016) found that participants' ability to access positive memories increased from bilateral tactile stimulation. Furthermore, tactile stimulation led to relaxation and a nonsignificant trend towards heightened vividness of these memories. These changes were reflected in participants' neurological activity (Amano & Toichi, 2016). Herkt et al. (2014) compared bilateral simultaneous, bilateral alternating, and absence of audio stimulations while confronting patients with disgusting pictures. They found that bilateral alternating stimulation outperformed the other conditions regarding neural activation patterns indicating facilitated emotional processing needed for lowering distress (Herkt et al., 2014). BEMs seem to be the more effective than auditive stimulations (Landin-Romero et al., 2018). For instance, van den Hout et al. (2012) found that the latter was less successful than BEMs in decreasing emotionality and vividness of trauma memories.

Physiological effects associated with BEMs are decreases in heart rate and galvanic skin response, increased parasympathetic activity, increased attentional flexibility (Oren & Solomon, 2012), and changes in interhemispheric interaction (Landin-Romero et al., 2018). The latter seems to improve episodic memory retrieval (Christman et al., 2003; Propper & Christman, 2008). The increase in parasympathetic activity may enable the memory's transformation and reconsolidation (Oren & Solomon, 2012).

Christman et al. (2003) proposed that while saccadic BEMs in EMDR may activate brain structures connected to episodic–explicit memory retrieval they do not influence those connected to traumatic memories. They proceed to argue that EMDR's benefit may lie in counteracting PTSD patients' dissociative amnesia. Furthermore, engaging in controlled eye movements when recalling distressing events, lowers the anxiety connected to them (Amano & Toichi, 2016; Landin-Romero et al., 2018).

The merit of bilateral stimulation has not been without debate. For instance, some say that it does not add anything other trauma therapy approaches utilizing exposure and deem BEMs to be an unnecessary component (e.g., Davidson & Parker, 2001). Others however, postulate that the BEMs do have an additional effect to exposure only (van den Hout & Engelhard, 2012). Furthermore, Gunter and Bodner (2009) showed that vertical stimulations are also effective in diminishing emotionality of memories. Therefore, the role bilateral stimulation as a driving treatment mechanism has been questioned (Gunter & Bodner, 2009). However, there has also been support for the importance of bilaterality. Vertical EMs failed to show

an effect on episodic memory retrieval as opposed to horizontal EMs (Christman et al., 2003). As mentioned above, overcoming the dissociative amnesia may be an important feature of EMDR (Amano & Toichi, 2016). Therefore, bilaterality of stimulations may be justified despite not being the only stimulation direction that decreases emotionality.

One can make further distinctions within the BEM category. Christman et al. (2003) found that only saccadic BEMs but not smooth eye pursuit improved memory retrieval. They note that this highlights the importance of distinguishing between the two and that current EMDR research is often not clear enough on which type has been employed. Furthermore, they speculate that negative results in EMDR research may be at least partly caused by using smooth pursuit instead of saccadic BEMs. Another feature that can be varied in bilateral stimulation is the speed with which it is administered. Fast BEMs have been found to be more successful in reducing emotionality and vividness of memories than slow BEMs (Maxfield et al., 2008). Stimulation used for resource installation is usually slower while it is rather fast during the reprocessing (Hase, 2021). Regarding the stimulation during resource installation van den Hout and Engelhard (2012) call the necessity of implementing bilateral stimulation into question. Findings have shown that it reduces emotionality and vividness irrespective of cognitions' valence. Therefore, the current practice may be counter effective (Hornsveld et al., 2011). However, another study found bilateral stimulation to increase positive emotions when applied during resource installation (Amano & Toichi, 2016) showing that more research is needed on the topic.

Interhemispheric Connectivity

The corpus callosum is a connective juncture between the brain's hemispheres responsible for information transfer (Cook, 1986) and lateralization (e.g., Josse et al., 2008). Such a connection is important since hemispheres are said to have distinctive functions. For instance, the left prefrontal cortex (PFC) seems to be involved in memory encoding while the right PFC is involved in memory retrieval (Saar-Ashkenazy et al., 2014). Research shows PTSD patients to have decreased volume of the corpus callosum which has been associated with decreased performance in memory tasks (Saar-Ashkenazy et al., 2014). This impairment has been speculated to be connected to lowered performance in tasks relying on both encoding as well as retrieval of information (Saar-Ashkenazy et al., 2014).

The interhemispheric connectivity hypothesis postulates that the bilateral stimulation activates both hemispheres leading to symmetrical neural activity (Propper & Christman, 2008), better interhemispheric communication, and processing of information (Calancie et al., 2018). Support can be found in a paper by Gunter and Bodner (2009) indicating

that increased interhemispheric connection is only induced by horizontal not vertical eye movements.

According to Propper and Christman (2008), the field benefitting from the interhemispheric connectivity after BEMs seem to be memory retrieval as opposed to encoding or consolidation (Propper & Christman, 2008). Specifically saccadic horizontal eye movements seem to not only enable better processing of associative memories but also to decrease false memories (Landin-Romero et al., 2018). Furthermore, Propper and Christman (2008) propose that the decrease of emotionality after BEMs is due to the alignment of hemispheric activity. They base this proposal on decreased activity on the right frontal lobe in depression and increased activity in the left frontal lobe for people with high well-being.

Rapid Eye Movement Sleep

This hypothesis is connected to the previously presented one as rapid eye movement (REM) sleep seems to increase interhemispheric connectivity (Propper & Christman, 2008). Furthermore, REM sleep has been shown to facilitate memory consolidation (Stickgold et al., 2001; Titone, 2002). EMDR might adjust traumatic memories in a similar manner so that they are weakened in impact (Landin-Romero et al., 2018). It has been proposed that the repeated reorientation of attention caused by bilateral stimulation results in neural activation that is comparable to that during REM sleep (Stickgold, 2002). BEMs can supposedly trigger the REM system (Söndergaard & Elofsson, 2008). According to Stickgold (2002), this activation facilitates the processing of memories. For EMDR that means that traumatic memories can be integrated into associative cortical networks. The patient can then “come to terms with the traumatic event”. Then, the memory and the emotionality associated with it can be weakened.

The REM hypothesis finds support in research showing comparable decreases in sympathetic activation during BEMs (Söndergaard & Elofsson, 2008). Additionally, REM sleep has been found to be impaired in PTSD patients (Mellman et al., 2007). A reasonable speculation is that the bilateral stimulation might serve as a substitute for the insufficient REM sleep, supporting memory reconsolidation (Stickgold 2008). Furthermore, there are indications of EMDR being helpful in reinstating healthy sleep patterns and lowering the vulnerability for PTSD (Landin-Romero et al., 2018). However, current empirical support seems to be only indirect.

Working Memory

According to Baddeley's multicomponent model of working memory it is a system with limited capacities (Repovs & Baddeley, 2006). Repovs and Baddeley (2006) described its four major components: the central executive, the phonological loop, the visuospatial sketchpad, and the episodic buffer. The central executive is thought to serve as a control system for the phonological loop and the visuospatial sketchpad and manipulate information. The phonological loop is thought to store phonological information. The visuospatial sketchpad is thought to store visual and spatial information. Lastly, the episodic buffer is thought to bind information and "create integrated episodes".

EMDR sessions are suggested to activate information from the visuospatial sketchpad (Landin-Romero et al., 2018). Thus, the agent of change lies less with BEMs themselves but with the combined task of BEMs and visual imagery that "draw on the limited capacity of the visuospatial sketchpad and central executive working memory resources" (Landin-Romero et al., 2018). The increased strain on cognitive resources lessens the memory's emotionality and vividness. Additionally, the theory proposes that through this decrease of emotionality and vividness the patient will feel themselves to be more removed from the event (Landin-Romero et al., 2018).

Support for the working memory account comes from a meta-analysis by Mertens et al. (2021). Results confirmed decreases in vividness and emotionality of emotional memories after combining them with dual tasks. Further support is provided by van den van den Hout and Engelhard (2012) who found decrease in vividness and emotionality after horizontal as well as vertical eye movements. This favors the working memory account over the interhemispheric connectivity explanations. The authors proceed to state the importance of an optimal level of memory taxation to make a therapeutic impact, anything above or below will not lead to the desired effect.

Neural Integration and Thalamic Binding

The thalamus has been titled the cornerstone of perceptual, cognitive, memorial, and somatosensory integration (Bergmann, 2008). This part of the brain is responsible for the timely synchronizing of incoming (perceptual, somatosensory, memorial, and cognitive) information, i.e., binding (Bergmann, 2008). Research shows that PTSD patients experience reduced thalamic activity (e.g., Kim et al., 2007). Consequently, they experience failures in somatosensory integration, cognitive integration, memory integration, and hemispheric dynamic integration (Bergmann, 2008).

Reestablishment of its prior activity level may be possible through bilateral stimulation

(Landin-Romero et al., 2018). Bergmann (2008) suggests the rehabilitation of the thalamus might mediate “the repair of the corpus callosum and of the lateralization” and facilitate the integration of traumatic memories into neural networks. Furthermore, Landin-Romero et al. (2018) proposes an increase of cognitive control, decrease of distress and general reestablishment of integrative functioning.

It must be noted that this is a speculative model (Landin-Romero et al., 2018). Currently, only sparse literature can be found on this account.

Other Proposed Mechanisms

Oren and Solomon (2012) propose several phase specific mechanisms. For instance, during the third phase of treatment (assessment), the “alignment of memory components” may play a role as a facilitator for processing. The activation of separate memory aspects of the traumatizing event may enable the patient to connect them, leading to a new understanding of that event. The same authors postulate that during the fourth treatment phase (desensitization), “mindfulness” may play a role. The patient is encouraged to take on a spectator role which may enable an increased emotional and cognitive awareness independent of judgement (Oren & Solomon, 2012).

Furthermore, they propose that the brief confrontation with their distressing memories followed by reporting their emotional state possibly increases coping efficacy and “perceived mastery”. This in turn, can be linked to dysfunctional memory storages allowing for more adaptive encoding.

Conclusion

The most accepted explanation regarding the mechanisms responsible for EMDR’s treatment success is the working memory account (Landin-Romero et al., 2018). However, it may not be the only explanation and it does not automatically negate the other presented theories. Therefore, future developments may go into the direction of more integrative models such as that presented by Coubard (2016).

EMDR in Virtual Reality and Video conferences

While EMDR therapy is typically administered in person, there can be situations where it is not possible to have therapist and patient in the same place (e.g., due to pandemic restrictions). This is where remote applications of EMDR become interesting. In the following two study will be presented, the first examined EMDR therapy in video conferences, the second examined a virtual reality (VR) application that has the potential to at least partially enable remote EMDR therapy.

Mischler et al. (2021) tested how EMDR treatment via video conference (eEMDR) is received by patients as well as therapists. The study found that patients SUD scores improved by over 70%. However, findings show that the SUD decrease per session is negatively related to the number of previous eEMDR sessions (Mischler et al., 2021). Therapists had a very positive impression of most of the sessions they conducted (Mischler et al., 2021). Additionally, most therapists indicate their willingness to continue eEMDR (Mischler et al., 2021). Furthermore, some advantages were acknowledged for having the patients in their domestic setting (Mischler et al., 2021). Another frequently mentioned advantage was an increased focus and engagement during sessions by patients.

Despite the overall positive reception of eEMDR certain challenges were mentioned (Mischler et al., 2021). Firstly, communication over screen hampered the detection of non-verbal cues. Secondly, the technology and internet connection led to problems. Thirdly, there were problems regarding the EMDR process itself. Moreover, the study indicates that eEMDR may not be suitable when the patient displays dissociation and/or severe mental illness (Mischler et al., 2021).

Nevertheless, eEMDR seems to be a feasible alternative to in-person treatment (Mischler et al., 2021). Furthermore, Mischler et al. (2021) conclude that eEMDR may not only be used as a short-term placeholder but can also be integrated in the long-term, beyond the COVID-pandemic.

Ijdema et al. (2022) assessed the effect of VR eye-movement application by Psylaris compared to classic eye movements and exposure. Outcomes of interest were the change of emotionality and vividness that accompany negative memories of healthy patients. The study found that there was a stronger decrease in emotionality after VR eye-movements

than after classical eye-movements. Furthermore, the exposure condition led to an increase in emotionality (Ijdema et al., 2022). Results for vividness were similar for VR eye-movements vs exposure. Vividness, increased significantly as well in the exposure condition (Ijdema et al., 2022). However, there was no difference between the classic and the VR eye-movement condition. The VR headset was reported to be comfortable and caused no nausea (Ijdema et al., 2022). Regarding emotionality Ijdema et al. (2022) concluded VR eye-movements to be superior. Regarding vividness the authors concluded non-inferiority of VR eye-movements.

The paper presents several speculations for the results found. Firstly, the VR environment may have offered a higher level of immersiveness. Secondly, there may have been a higher taxation of the working memory in the VR condition, since it offered to inspect the three-dimensional environment between sets, while the other conditions had participants concentrate on the two-dimensional screen in front of them. Thirdly, the novelty of VR may have played a role. Lastly, to equate all conditions as much as possible, participants were unusually close to the screen in the non-VR conditions. Furthermore, emotionality and vividness were only assessed directly after each condition ended and not at a later follow-up. Ijdema et al. (2022) mention that their study had limitations in that participants were no PTSD patients and that they did not take any working memory measurements which may have explained the partial superiority of VR. However, the study possesses great power and bias was minimized by matching the conditions as much as possible. Overall, Psylaris' VR eye-movement application seems to be promising for the processing of distressing memories.

EMDR Across Disorders

EMDR is an effective treatment for single episode trauma, complex trauma (Oren & Solomon, 2012), and the dissociative subtype of PTSD (Valiente-Gómez et al., 2017). Apart from PTSD, the treatment has also been successfully applied in phobias (e.g. dental phobia), panic disorder, generalized anxiety disorder, conduct problems, self-esteem, complicated mourning, body dysmorphic disorder, olfactory reference syndrome, sexual dysfunction, pedophilia, performance anxiety, pain management (chronic pain, migraine headaches, and phantom limb pain), bipolar disorder, psychosis, unipolar depression, obsessive compulsive disorder, and alcohol dependency (Landin-Romero et al., 2018; Oren & Solomon, 2012;

Valiente-Gómez et al., 2017). An elaboration on all disorders that EMDR has been tested on is beyond the scope of this paper. Therefore, the focus will lie on those areas that a substantial amount of literature has been found for, namely, anxiety disorders, depression, psychotic disorders, substance use disorder, and chronic pain.

Anxiety Disorders

A case study conducted with three generalized anxiety disorder (GAD) patients by Farima, Dowlatabadi, and Behzadi (2015) indicated that EMDR has the potential to reduce pathological worry. Furthermore, the therapy succeeded in minimizing the patients' extent of areas of worrying, building tolerance to uncertainty, and reducing cognitive avoidance. These results seemed to remain until at least one month after treatment had ended. Similarly, Gauvreau and Bouchard, (2008) performed another case study with four GAD patients. Throughout the study and at follow-up the patients' anxiety levels decreased to a point below GAD's diagnostic criteria. Additionally, symptoms of depression, intolerance of uncertainty, and cognitive avoidance decreases as well. Barker and Barker (2007) conducted a single case study, treating an individual with performance anxiety with EMDR. Results indicate a substantial reduction of anxiety and ratings of the individual's performance during presentations improved as well. A subjective follow-up report indicates a long-lasting maintenance of these improvements. Goldstein et al. (2000) compared EMDR to a placebo treatment and a waitlist condition for panic disorder with agoraphobia and found less optimistic results. While EMDR did outperform the waitlist condition regarding certain measurements, differences to the attention placebo condition were not statistically significant. The authors indicate that the effect sizes were generally low and advise against using EMDR as a first-line treatment for panic disorder with agoraphobia. A case control study comparing the effectiveness of EMDR to CBT for obsessive compulsive disorder (OCD) indicated no differences between the treatments' success (Marsden et al., 2018).

A review by Valiente-Gómez et al. (2017) summarized findings from several randomized controlled trials (RCTs) on anxiety disorders. They found several trials that successfully reduced anxiety and OCD symptoms. Furthermore, EMDR seemed to lower anxiety, panic disorder, and agoraphobia severity but not self-esteem, anxiety related cognitions or frequency of panic attacks (Valiente-Gómez et al., 2017). Overall, Valiente-Gómez et al. (2017), concluded that EMDR may be most suited for specific phobias.

Depression

EMDR has not been developed for the purpose of treating depression, however, research

is examining whether it may have merit in this specific area. For instance, Gauhar (2016) examined EMDR treatment would alleviate depressive symptoms in patients with primary major depressive disorder (MDD). The treatment focused on processing past or present trauma. Results show a decrease in depressive symptomatology, depressive cognitions, and negative beliefs which was maintained for three months after treatment conclusion. Hase et al. (2015), on the other hand, focused EMDR treatment on events that precipitated the patients last/worst depressive episode. They examined whether this addition of EMDR to inpatients' usual treatment might facilitate the reduction of depressive symptoms. This approach outperformed the treatment as usual group regarding clinical and statistical significance. Furthermore, Wood, Ricketts, and Parry (2018) applied the standard protocol as an alternative for depression patients who did not respond to prior treatments. This study concludes that EMDR is a viable treatment alternative for this specific patient group. Furthermore, patients seem to be accepting of the approach and no difficulties have been observed. The practicing therapists stressed the importance of assessing the patients' readiness for bilateral stimulation and indicated that this assessment took longer with the depressed patients than what they experienced with PTSD patients. It must be noted that while none of the participants reached the diagnostic threshold for PTSD, there were indications of traumatization in this sample, potentially explaining part of the successful treatment. An important note regarding the presented trials is that they worked with rather small sample sizes. Therefore, the attention is now turned towards cumulative works.

A systematic review by Valiente-Gómez et al., (2017) in line with the discussed effects concluding that EMDR outperformed group therapy, psychoeducational treatment, and psychodynamic therapy, and was a valuable addition to treatment as usual. Furthermore, EMDR seems to be not only a suitable depression treatment but also improve somatic and psychological symptoms for patients that suffered myocardial infarction (Valiente-Gómez et al., 2017). Lastly, EMDR seems to be able to generate cognitive improvements in unipolar depression patients such as memorizing circumstances at episode onset, emotional cognitive processing, and organizing long-term memory (Valiente-Gómez et al., 2017). Meta-analytic results show that EMDR reached higher effects when compared to several depression treatment approaches such as TAU, talk therapy, biofeedback, etc. (Sepehry et al., 2021). These findings stretched over several measurements and subtypes of depression (Sepehry et al., 2021). However, analysis suggests high study heterogeneity and publication bias, warranting to interpret these results with caution (Sepehry et al., 2021).

Lastly, while there have been successful applications of EMDR in patients with bipolar depression, Valiente-Gómez et al. (2017) are reluctant to conclude it to be the most suitable treatment for this patient group due to the minimal amount of research. However, they

acknowledge its potential to reduce symptoms of trauma and stabilize affect.

Psychotic Disorders

There is a small body of research investigating the utilization of EMDR in psychotic populations, often this research has been conducted with patients that suffer from only psychotic disorder but also PTSD. For instance, van den Berg and van der Gaag (2012) conducted a small pilot study which indicated that treating PTSD with EMDR in patients with schizophrenia spectrum disorder led to decreases of trauma, auditory hallucinations, delusions, anxiety, and depression. Importantly treatment focus laid on PTSD not schizophrenia spectrum disorder. However, the authors speculate that certain symptoms such as auditory hallucinations may have been rooted in trauma. For patients that fit this description this might indicate that EMDR for PTSD will also positively impact their hallucinatory symptoms. A systematic review by Adams, Ohlsen, and Wood, (2020) indicates overall results on EMDR's impact on hallucination to be mixed, the same is true for paranoid thinking.

Another review revealed that EMDR treatment of psychotic disorders failed to outperform prolonged exposure or progressive relaxation therapy in two studies (Valiente-Gómez et al., 2017). However, another trial found EMDR to be more effective than prolonged exposure in trauma and psychotic symptoms of patients with a psychotic disorder (Valiente-Gómez et al., 2017). Overall application of EMDR to PTSD in psychotic populations seems to be effective and safe (Adams, Ohlsen, & Wood, 2020; van den Berg & van der Gaag, 2012). However, due to the scarce and divided evidence base as direct treatment for psychotic disorders, EMDR seems not to be recommendable as primary treatment in this patient group (Valiente-Gómez et al., 2017).

Substance Abuse

Marich (2009) presented a case study observing a patient struggling with alcohol and drug abuse. Despite previous treatment the patient never succeeded in staying sober beyond four months. Furthermore, the patient experienced prior childhood and adult sexual abuse. They went through the 12-step program of alcoholics anonymous while receiving additional EMDR treatment targeting their sexual trauma. The patient stayed sober throughout the entire treatment process (> one year). Afterwards, they were able to make improvements regarding her employment situation and showed improvement in perceived self-worth. The author notes that she believes that EMDR is not to be used as a stand-alone treatment but can be a helpful addition to TAU with complex addiction populations. Instead of focusing

on trauma memories it is also possible to focus EMDR on addiction memories. A small study by Hase, Schallmayer, and Sack (2008) investigated whether the addition of two such EMDR sessions to addiction TAU would be superior to addiction TAU alone. Results indicated greater reductions in cravings up to 1 month after treatment. Furthermore, the TAU+EMDR group had a lower relapse rate.

A systematic literature review concluded that patients with substance use disorders benefited from EMDR treatment as indicated by improved craving, drinking behavior, and depression (Valiente-Gómez et al., 2017). However, Attention must be paid to the readiness and safety structures of substance abuse patients before providing EMDR treatment (Zweben & Yeary, 2006). Overall literature indicates that EMDR may be a useful addition to primary addiction treatment.

Pain Disorders

Small studies investigating specific pain EMDR protocols show promising results. For instance, Mazzola et al. (2009) found that chronic pain patients perceived significantly less pain, pain-related negative affect, depression, and anxiety after receiving 12 weekly EMDR sessions. Similarly, another study found that chronic patients perceived less pain, pain-related negative affect, and increased coping ability after receiving nine weekly EMDR sessions (Grant & Threlfo, 2002). Furthermore, in a patient population with chronic back pain and prior traumatization, pain focused EMDR managed to minimize the intensity of pain and diminish the patient's disability when added to TAU (Gerhardt et al., 2016).

A study by Schneider et al. (2008) investigated the potential effect of standard EMDR on phantom limb pain. Treatment focused on amputation related events as well as self-esteem, pain, triggers, and cognitions about the future. Results show positive effects on pain perception and several cases were able to stop or at least reduce pain medications. A review by van Rood and de Roos (2009) supports this study's sentiment and concludes that studies on EMDR and phantom limb pain allow for optimism.

EMDR seems to be a valuable treatment option for patients whose somatizations are trauma related (van Rood & de Roos, 2009). For more robust conclusions on the general topic of pain management and treatment via EMDR more large-scale trials are needed.

EMDR Across Cultures

A valuable characteristic of EMDR is that it is not bound to one specific therapeutic philosophy, its versatility shows in its successful teaching across several nations (Oren & Solomon, 2012). Furthermore, the treatment has been effective for trauma patients from various cultures. For instance, Syrian and Iraqi refugees in Germany experienced improvement of sleep, stress levels, posttraumatic stress, and potentially depression (Lehnung et al., 2017).

Another study examined the treatment's potential to help Yazidi survivors with implicit trauma in Northern Iraq. Applying the Blind-2-Therapist protocol was able to significantly reduce the women's distress up to a year after treatment (Farrell et al., 2020). This specific protocol is especially suited for patients that are reluctant to share their traumatic experience with their therapist (Farrell et al., 2020).

In England, Libyan and Syrian child refugees did benefit from EMDR group treatment as indicated by distress reduction, increased awareness of personal strengths, and hope for the future (Hurn & Barron, 2018). Due to the language barrier Arabic interpreters were present at all sessions (Hurn & Barron, 2018). Collaborating with these interpreters enabled Hurn and Barron (2018) to identify several points of attention when working with this specific patient population. Firstly, working in a group was received well due to the culture's collectivistic mindset. Secondly, one must be aware of the stigma surrounding psychological illness in Arab cultures. Thirdly, mental health may be understood differently across geographical regions. Lastly, certain terminology did not have direct translations, which is why interpreters should be as well informed as possible about each session's content.

Mbazzi et al. (2021) conducted research regarding protocol changes for optimal implementation of EMDR in sub-Saharan countries. A total of 25 EMDR therapists from varying African countries provided insights into possible adjustments. The most prevalent propositions were to change phrasing, incorporate cultural expressions of cognitions and emotions, use tactile instead of visual stimulation, and to adapt the numeric nominal VOC/SUD scales to something more simple and culturally relevant (more detailed specific propositions can be found in the original article). Despite the therapists' general preference of EMDR over other approaches, the authors emphasize the importance of

EMDR organizations to take these findings into account for training and implementation of EMDR in these countries.

Alternative EMDR Forms

As previously alluded to, several EMDR protocols have been developed and customized to specific kinds of patients beyond but also within the PTSD population. A more comprehensive description of them can be found in “Eye movement desensitization and reprocessing: Basic principles, protocols, and procedures” by Shapiro (2018). The following paragraphs will concentrate on a select few, namely: the B2T protocol, the R-TEP protocol, and the EMDR-URG protocol.

The B2T EMDR protocol was developed so that it is not necessary for the patient to disclose the content of their problem (Blore & Holmshaw, 2009). As such it is especially suited for individuals who fear other people’s (/the therapist’s) reactions to their issue (Blore & Holmshaw, 2009). A study by Farrell et al. (2020) highlighted several of advantages this protocol. Firstly, traumas connected to shame and/or fear of consequences when disclosing can be addressed safely, which becomes especially important in politically unstable regions. Secondly, in more severe cases, therapists and others involved in treatment are shielded from becoming traumatized themselves. Thirdly, the protocol allows for more autonomy on the patient’s side. Being able to control how much they want to reveal can increase empowerment. Fourthly, the protocol is more flexible to different cultures and languages, especially when compared to exposure-based therapy. Lastly, the protocols seemed to prevent patient’s from being confronted with potential stigmas surrounding their psychopathology and its origins. Interestingly, several participants of this study later chose to disclose about their trauma in the B2T conditions but also reported that would not have worked on it at all if they would have had to disclose (Farrell et al., 2020). In this regard, Farrell et al. (2020) found that a patient’s willingness to disclose is negatively related to their SUDs. Overall, they concluded that the B2T is safe, well-tolerated and effective.

The recent traumatic episode protocol (R-TEP) falls into the category of early EMDR interventions (EEI) (Shapiro & Laub 2014). These interventions are special in that they are applied before the traumatic memory has been consolidated (Shapiro & Laub 2014). R-TEP

was developed to address that EEI may not have had enough focus on the fact that one is dealing with an active trauma continuum (Shapiro & Laub 2014). This protocol integrates this temporal view with parts of previous recent event protocols (Shapiro & Laub 2014). How the eight phases have been adapted can be looked up in “The Recent Traumatic Episode Protocol (R-TEP): An Integrative Protocol for Early EMDR Intervention (EEI)” by Shapiro and Laub (2014). Shapiro, Laub, and Rosenblat’s (2018) study examined the protocol’s effectiveness for civilians in the Gaza region three months after they had to endure intense rocket attacks. Results showed decreases in depression and post-traumatic stress scores after three 90-minute sessions compared to a waitlist group. Furthermore, Saltini et al. (2018) found promising results for the protocol for victims of natural disasters. Data from earthquake survivors in Italy showed that victims treated within one month of the event, improved on the revised impact of event scale (Saltini et al., 2018).

The EMDR-URG protocol is heavily inspired by the critical incident stress debriefing, contents of the standard protocol, the recent event protocol, the R-TEP protocol, the modified abridged EMDR protocol, and the emergency response procedure (Tarquinio et al., 2012). The six-phase protocol functions as an intervention immediately after a traumatizing event has occurred (Brennstuhl et al., 2013), i.e., 24 to 78 hours after (Blenkinsop, et al., 2018). Furthermore, it is fit for individual treatment (Blenkinsop, et al., 2018). It contains the following steps: assessment and history taking (phase 1), overview of trauma and education on protocol (phase 2); trauma recall (phase 3); SUD measurement (phase 4); desensitization (phase 5); final SUD measurement (phase 6) (Brennstuhl et al., 2013). When tested on employees that suffered aggression or violence at their workplace within 48 hours after the incidence, Brennstuhl et al. (2013) found significant and long-lasting decreases in post-traumatic stress measures compared to eclectic treatment. The study concluded that EMDR-URG is a valuable approach to prevent PTSD onset. Tarquinio et al. (2012) found the protocol to be suited for survivors of sexual assault as well. However, they note that while decreased, the SUD scores did not reach zero.

EMDR compared to other therapeutic approaches

EMDR distinguishes itself from trauma-focused cognitive behavioral therapy (tfCBT) in that it does not require in-depth of the memory, extended exposure, homework, or direct

modification of cognitions (Landin-Romero et al., 2018). The latter is assumed to change naturally throughout the treatment process (Oren & Solomon, 2012). Furthermore, due to the lack of homework EMDR is much less time consuming for the patient (Oren & Solomon, 2012). Despite this disparity, EMDR generates similar successes as tfCBT (Oren & Solomon, 2012). The additional benefit of decreased trauma exposure makes EMDR even more tolerable (Oren & Solomon, 2012). Hase (2021) notes that another aspect that discerns EMDR from other therapies is the therapeutic relationship. However, the author also indicates a lack of literature on how this relationship differs from the ones in other interventions. Something literature can be found on however, is how the treatment mechanisms in EMDR differ from the ones in exposure therapy. As previously mentioned, EMDR is said to reach its effect through memory reconsolidation (i.e., altering memory). Exposure on the other hand is thought to work via extinction (i.e., creating a new competing memory) (Oren & Solomon, 2012).

Several studies and meta-analyses have compared EMDR's performance to that of other treatment approaches. For instance, Jaberghaderi (2004) conducted a small-scale study comparing EMDR to CBT regarding efficiency and effectiveness. Participants were 12- to 13-year-old girls from Iran with PTSD due to sexual abuse. Symptomatic and behavioral outcomes improved significantly, independent of treatment type. However, symptom reduction was higher with EMDR on a non-significant level. Furthermore, there was a significant difference of efficiency favoring EMDR. A randomized controlled trial by Wanders, Serra, and de Jongh (2008) investigated EMDR and CBT prior to standard treatment for self-esteem and behavioral issues. They found that EMDR was more effective than CBT in managing behavioral problems in children. Effects on self-esteem issues were comparable. Results in both problem areas lasted up to the six-month follow-up assessment. Furthermore, Marsden (2018) conducted a comparative study, investigating EMDR's and CBT's (exposure and response prevention) effects on OCD. It was shown that completion rates and OCD score improvements did not differ between intervention types, neither post-treatment nor at six-month follow-up. A meta-analysis by Khan et al. (2018) found that EMDR outperformed CBT (majority exposure based) regarding reduction of post-traumatic symptoms and anxiety. Reduction of depression was comparable across therapy types. Another, meta-analysis by Seidler and Wagner (2006) compared tfCBT and EMDR regarding their efficacy. Results indicate that both interventions performed equally well in improving PTSD. However, it must be noted that only seven studies have been compared which is unusually small for a meta-analysis. However, a meta-analysis by Lewey (2018) found that despite being effective in reducing PTSD symptoms, EMDR was outperformed by tfCBT. Overall, research on comparative performance of EMDR seems to be mixed.

Conclusion

To summarize, with its basis on the AIP model (Hase, 2021), EMDR approaches psychopathology by rectifying inadequate storage of memories, systematically reprocessing them, and linking them to adaptive information utilizing bilateral stimulation (Oren & Solomon, 2012). Throughout the phases of the protocol, focus is cast towards past experiences, present triggers, and future templates (Hase, 2021). Among the many proposed mechanisms of actions, the working memory account is the most accepted (Landin-Romero et al., 2018). However, it may not be the only explanation and it does not automatically negate the other presented theories. Therefore, future developments may go into the direction of more integrative models (Landin-Romero et al., 2018).

Research suggests that remote online administration of EMDR is a viable alternative to the in-person approach (Mischler et al., 2021). Furthermore, research on EMDR-VR is emerging and gives tentative evidence for its effectiveness.

Though initially developed for PTSD, preliminary evidence suggests that EMDR could also be a viable treatment option for depression (e.g., Sepehry et al., 2021), specific phobias (Valiente-Gómez et al., 2017) and trauma-related somatization (van Rood & de Roos, 2009). Furthermore, EMDR may be a possibly helpful add on to TAU in addiction populations with or without comorbid trauma (e.g., Marich, 2009; Valiente-Gómez et al., 2017). No literature was found indicating that sole EMDR is suited to target psychotic disorder itself. However, it could be valuable in addressing comorbid PTSD (e.g., Adams et al., 2020; van den Berg & van der Gaag, 2012).

EMDR has not only shown adaptability to disorders beyond PTSD but also therapists and patient populations from non-western cultures (e.g., Farrell et al., 2020; Hurn & Barron, 2018; Mbazzi et al., 2021). The treatments general adaptability is further supported by the successful implementation of altered protocols such as the B2T protocol (Farrell et al., 2020), R-TEP (e.g., Saltini et al., 2018), and the URG protocol (e.g., Brennstuhl et al., 2013). The presented literature comparing EMDR's success to other treatment approaches paints a mixed picture (e.g., Jaberghaderi, 2004; Lewey, 2018; Oren & Solomon, 2012; Seidler & Wagner, 2006).

Despite the optimistic picture of EMDR's utility that can be found by many authors one has to be aware that the treatment and the research on it come with limitations. Notably, studies investigating EMDR show great heterogeneity regarding design, measurement instruments, data collection methods, and participant numbers (Chen et al., 2014) making the many positive conclusions that have been drawn by cumulative works less robust. Furthermore, the current practice of utilizing bilateral stimulation during resource installation may be misguided as it has been suggested to reduce positive as well as negative emotionality (Hornsveld et al., 2011). Lastly, a rather big point that was not explored in this article is that there are concerns regarding the treatments influence on patients' memory. Kenchel et al. (2020) discussed the existing body of literature currently available on the topic and concluded that while susceptibility to misinformation could not be proven definitively, there may be a relationship between EMDR and spontaneous false memories.

Future research needs to determine the extent of the latter. Furthermore, the potential downsides of bilateral stimulation during resource installation needs to be explored. Lastly, additional research and evidence is necessary to get a better picture of EMDR's utility in disorders other than PTSD.

In conclusion, despite the need for further research, EMDR is a promising treatment approach with many areas of applicability.

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