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Original article

## EMDR therapy: An overview of its development and mechanisms of action

### *La thérapie EMDR : un aperçu de ses développements et mécanismes d'action*

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#### ABSTRACT

**Introduction.** – This article examines the history and development of Eye Movement Desensitization and Reprocessing (EMDR), from Dr. Francine Shapiro's original discovery in 1987, to current findings and future directions for research and clinical practice.

**Elements of the literature.** – An overview is provided of significant milestones in the evolution of EMDR over the first 20 years, including key events, research and scientific publications, and humanitarian efforts. The authors also describe the Adaptive Information Processing (AIP) model, which is the theoretical basis of the therapy; they address the question of mechanisms of action, and EMDR's specific contribution to the field of psychotherapy.

**Discussion.** – EMDR is an integrative psychotherapy, which sees dysfunctionally stored memories as the core element of the development of psychopathology. In its view of memory, it integrates information that is sensory, cognitive, emotional and somatic in nature. The EMDR protocol looks at past events that formed the presented problem, at the present situations where the problem is experienced, and at the way, the client would like to deal with future challenges.

**Conclusion.** – EMDR is a 25-year-old therapy that has accumulated a substantial body of research proving its efficiency, and is now part of many professional treatment guidelines. The research is pointing to its potentially large positive impact in the fields of mental and physical health.

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#### R É S U M É

**Introduction.** – Cet article examine l'histoire et le développement de l'Eye Movement Desensitization and Reprocessing (EMDR) depuis la découverte originale du Dr Francine Shapiro en 1987 jusqu'aux résultats actuels et aux directions futures pour la recherche et la pratique clinique.

**Éléments de la littérature.** – Une vue d'ensemble est apportée des étapes déterminantes de l'évolution de l'EMDR au cours des 20 premières années, incluant les événements clés, la recherche, les publications scientifiques et les projets humanitaires. Les auteurs décrivent également le modèle du traitement adaptatif de l'information qui constitue la base théorique de la thérapie et abordent la question des mécanismes d'action et de la contribution spécifique de l'EMDR au domaine de la psychothérapie.

**Discussion.** – L'EMDR est une psychothérapie intégrative qui considère les souvenirs stockés de manière dysfonctionnelle comme un élément central dans le développement de la psychopathologie. Dans sa vision, la mémoire intègre des informations sensorielles, cognitives, émotionnelles et somatiques. Le protocole EMDR aborde les événements passés qui ont formé le problème présent, les situations présentes dans lesquelles le problème est rencontré et la manière dont le patient aimerait gérer les défis futurs.

**Conclusion.** – L'EMDR est une thérapie de 25 ans qui a accumulé un ensemble conséquent de recherches prouvant son efficacité et figure maintenant dans de nombreuses directives professionnelles. La recherche commence à montrer son impact potentiellement très positif sur de nombreux domaines de la santé mentale et physique.

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Eye Movement Desensitization and Reprocessing (EMDR) is a therapeutic approach guided by the adaptive information processing (AIP) model. In this integrative psychotherapy approach, dysfunctionally stored memories are considered to be the primary basis of clinical pathology. The processing of these memories and integration within larger adaptive networks allows for their transmutation and reconsolidation. Within the past 25 years, sufficient research has accumulated for EMDR therapy to be widely recognized as an effective treatment of trauma. The history of the therapy, AIP model, clinical applications and procedural elements is described. In addition, the research support for two dominant theories pertaining to the underlying mechanisms of action regarding the bilateral stimulation (BLS) used in EMDR therapy are explored.

EMDR is an integrative psychotherapeutic approach with procedural elements compatible with most orientations (Shapiro, 2001, 2002). The therapy is guided by the AIP model that emphasizes the role of the brain's information processing system in the development of human health and pathology. AIP conceptualizes insufficiently processed memories of disturbing or traumatic experiences as the primary source of all psychopathology not caused by organic deficit. The processing of these memories is posited to lead to resolution through the reconsolidation and assimilation within the larger adaptive memory networks. EMDR is an eight-phase treatment, including a tripartite protocol that focuses on:

- the memories underlying current problems;
- present situations and triggers that must be specifically addressed to bring the client to a robust state of psychological health;
- and the integration of positive memory templates for future adaptive behavior.

One of the distinguishing characteristics of EMDR is its use of bilateral stimulation, such as side-to-side eye movements, alternating hand taps, or alternating auditory tones that are employed within standardized procedures and protocols to address all facets of the targeted memory network.

## 1. History

The development of EMDR began in 1987 when Shapiro recognized the effects of eye movements on disturbing memories. This led to her developing a treatment protocol she named Eye Movement Desensitization (EMD). Coming from a behavioral background, Shapiro initially perceived the impact of the eye movements to be similar to that of systematic desensitization, and believed it was based on an innate relaxation response. She also assumed that the EMD process was related to the Rapid Eye Movement (REM) sleep phenomenon and its effects. Her initial research was a randomized trial showing promising results in the treatment of sexual assault victims and war veterans (Shapiro, 1989).

Shapiro continued to develop and refine the procedures used in EMD beyond a behavioral paradigm and in 1991 changed its name to EMDR. The addition of the word "reprocessing" came out of her understanding that desensitization was only one outcome of the therapy, and that the broader effects could be better understood through information processing theory.

The beginning of the 1990s were years of great development and great controversy for EMDR. The support of Joseph Wolpe, the originator of systematic desensitization, and the publication of several studies showing positive results (Marquis, 1991; Wolpe & Abrams, 1991) were clear signs that EMDR was a promising form of psychotherapy. On the other hand, opponents of EMDR

were questioning the role of the eye movements (Lohr et al., 1992), and the scientific basis for adding them to what they saw as exposure therapy (McNally, 1999). These criticisms were viewed as misguided (for an overview see Perkins & Rouanzoin, 2002), and the controversy did not deter Shapiro and her colleagues, but rather spurred the call for additional research. As empirical support accumulated, EMDR therapy trainings took place all over the USA and also in Europe, Australia and in Central and South America.

Beginning at a very early stage, the EMDR Institute ([www.emdr.com](http://www.emdr.com)) trainers' began providing pro-bono trainings at war and disaster zones around the world. In 1995, as part of the EMDR community's response to the Oklahoma City bombing, The EMDR Humanitarian Assistance Program (EMDR-HAP) was formed. EMDR-HAP ([www.emdrhap.org](http://www.emdrhap.org)) and its branches around the world have provided hundreds of pro-bono trainings in places like war torn Bosnia, Nicaragua, North Ireland, Mexico City, post earthquake Istanbul, post tsunami South East Asia, Israel, Palestine, and post earthquake Haiti, as well as many USA public agencies. Since 1995 when the first EMDR association was established in the USA ([www.emdria.org](http://www.emdria.org)), many other national and regional associations were established, including EMDR Asia ([www.emdr-asia.org](http://www.emdr-asia.org)), EMDR Ibero-America ([www.emdriberoamerica.org](http://www.emdriberoamerica.org)), and the EMDR Europe Association ([www.emdr-europe.org](http://www.emdr-europe.org)) with over 20 national association affiliates and more than 8000 members.

The vast body of research that has accumulated over the past 20 years has led EMDR to be declared an effective trauma treatment in many of the clinical guidelines of professional organizations and national mental health services. In Europe these include the Clinical Resource Efficiency Support Team of the Northern Ireland Department of Health (CREST, 2003), the Dutch National Steering Committee Guidelines for Mental Health Care (2003), the French National Institute of Health and Medical Research (INSERM, 2004), the British National Collaborating Centre for Mental Health (NICE, 2005), the Swedish Council on Technology Assessment (2001), and the United Kingdom Department of Health (2001). In the USA, these include the American Psychiatric Association (2004), the American Psychological Association (Chambless et al., 1998), the National Institute of Mental Health (2007), and the Department of Veterans Affairs and Department of Defense (2004). The International Society for Traumatic Stress Studies (ISTSS) also included EMDR in its guidelines (Foa, Keane & Friedman, 2009) (<http://www.emdr-europe.org/info.asp?CategoryID=15>).

## 2. Research

The numerous practice guidelines and several meta-analyses (Bisson & Andrew, 2007) indicate that EMDR achieves therapeutic effects that are equivalent to and as long lasting as those of the most researched cognitive-behavioral therapy methods. Approximately 20 controlled studies have validated the efficacy of EMDR therapy in the treatment of PTSD, while numerous studies and case reports indicate EMDR's effectiveness with a wide range of disorders, including phobias (de Jongh, Ten Broeke & Rensen, 1999; de Jongh, van den Oord & Ten Broeke, 2002), panic disorder (Goldstein et al., 2000; Fernandez & Faretta, 2007), generalized anxiety disorder (Gauvreau & Bouchard, 2008), conduct problems and self-esteem (Soberman, Greenwald & Rule, 2002), complicated mourning (Solomon & Rando, 2007), body dysmorphic disorder (Brown, McGoldrick & Buchanan, 1997), olfactory reference syndrome (McGoldrick, Begum & Brown, 2008), sexual dysfunction (Wernik, 1993), pedophilia (Ricci et al., 2006) performance anxiety (Barker & Barker, 2007), chronic pain (Grant & Threlfo, 2002), migraine headaches (Marcus, 2008), and phantom limb pain (Schneider et al., 2008; Tinker & Wilson, 2006; de Roos, Veenstra et al., 2010). While most studies have evaluated EMDR's

impact on adults, several studies have demonstrated outstanding positive effect with children (Greenwald, 1998; Ahmad & Sundelin-Wahlsten, 2008; Chemtob, Nakashima & Carlson, 2002; de Roos & de Jongh, 2008; Jabergaderi, Greenwald, Rubin, Dolatabadim & Zand, 2004). A meta-analysis reported “incremental efficacy when effect sizes are based on comparisons between EMDR and established (CBT) trauma treatment” (Rodenburg, Benjamin, de Roos, Meijer & Stams, 2009).

When looking at the outcome research comparing EMDR and CBT, one should keep in mind that EMDR therapy does not include the 30 to 100 hours of home work that are included in most CBT therapies. Thus, EMDR is able to achieve its therapeutic impact with less exposure to the trauma and with only in session treatment. This fact makes it a more user friendly, better tolerated therapy for both clients and therapists (Arabia, Manca & Solomon, 2011), as well as able to achieve positive treatment effects utilizing consecutive day treatment (Wesson & Gould, 2009).

One element of EMDR, the bilateral stimulation, has been the aspect that has attracted the most attention by both clinicians and researchers. While several theories have been posited to explain its effects, the underlying mechanisms are still under investigation. Early component analyses evaluating the eye movements indicated mixed results. However, this research has been criticized as flawed because of the use of inappropriate populations and insufficient treatment doses (Chemtob, Tolin, van der Kolk & Pitman, 2000). On the other hand, specific physiological effects of eye movements during EMDR treatment sessions have been identified (Propper et al., 2007; Elofsson, von Scheele, Theorell & Sondergaard, 2008; Sack, Lempa, Steinmetz, Lamprecht & Hofmann, 2008; Wilson, Silver, Covi & Foster, 1996). The research suggests that eye movements result in an increase in parasympathetic activity and a decrease in psychophysiological arousal. Similar physiological results were found following one session of EMDR, evidenced by lowered heart rate and skin conductance (Aubert-Khalifa, Roques & Blin, 2008).

There are two theories that have garnered the most research support. One involves the inauguration of an orienting response that is believed to link into the processes found in REM sleep (Stickgold, 2002, 2008). In support of this theory, randomized studies have found that eye movements enhanced retrieval of episodic memories (Christman, Garvey, Propper & Phaneuf, 2003), increased attentional flexibility (Kuiken, Bears, Miall & Smith, 2002; Kuiken, Chudleigh & Racher, 2010) and increased recognition of true information (Parker & Dagnall, 2007; Parker, Relph & Dagnall, 2008; Parker, Buckley & Dagnall, 2009). The orienting response hypothesis has also been evaluated by studies demonstrating decreased arousal (MacCulloch & Feldman, 1996; Barrowcliff, Gray, MacCulloch, Freeman & MacCulloch, 2003; Barrowcliff, Gray, Freeman & MacCulloch, 2004; Schubert, Lee & Drummond, 2011).

The second dominant hypothesis is that the eye movements and other forms of dual attention stimuli (i.e., taps and tones) disrupt working memory. Randomized studies evaluating this hypothesis have found that the eye movements decrease vividness and/or emotionality of memories and imagery of anticipated fears (Andrade, Kavanagh & Baddeley, 1997; Engelhard, van Uijen & van den Hout, 2010; Engelhard et al., 2011; Gunter & Bodner, 2008; Kavanagh, Freese, Andrade & May, 2001; Maxfield, Melnyk & Hayman, 2008; Sharpley, Montgomery & Scalzo, 1996; van den Hout, Muris, Salemink & Kindt, 2001; van den Hout et al., 2011). At this time, it is not known whether the change in vividness and emotionality precedes or follows the physiological de-arousal and whether these occur together or are separate elements (Sack et al., 2007, 2008a, b).

Ten randomized studies have reported effects supporting each of these hypotheses. Consequently, there is good reason to believe that both theories are correct and interactively contribute to EMDR's therapeutic effects. The aggregate of these findings

indicate that while the earlier component analyses failed to prove the importance of bilateral stimulation as part of EMDR, there seems little doubt that a new generation of component analyses with diagnosed populations will complement this knowledge base, provided they are conducted with appropriate rigor (Shapiro, 2001).

### 3. The adaptive information processing model

The development of EMD to EMDR was based upon the AIP model, which is the theoretical framework that guides EMDR's clinical practice (Shapiro, 1995, 2001). According to this model, memory networks of stored experiences are the basis of both human health and human pathology. New experiences are a never-ending stream of conscious and unconscious bits of information that are processed by the brain's information processing system and integrated within these memory networks. The system is seen as adaptive since under normal functioning it is able to use information to support human growth and development via learning. The relevant sensory, cognitive, emotional and somatic information is stored in memory networks that will be used in the future to adaptively guide the person's reactions to the world around him.

Some distressing negative events seem to overwhelm the information processing system and thus prevent their adaptive assimilation. The event is posited to be stored in memory containing the disturbing emotions, physical sensations and perspectives experienced at the time of the event. These situations are at times significant traumas, but more often are the daily negative events that people experience within families, relationships, schools, work places, etc., like humiliations, rejections, failures, among others. When such situations take place, the information regarding the negative event is stored in isolation, unable to connect with the adaptive memory networks. Current situations may trigger the earlier memory, causing the person to experience some or all of its sensory, cognitive, emotional and somatic aspects resulting in maladaptive or symptomatic behavior.

The AIP model views negative beliefs, behaviors and personality characteristics as resulting from the dysfunctionally stored memories (Shapiro, 2001). From this perspective, a negative self-belief (e.g. “I am stupid”), a negative emotional reaction (e.g. fear in the presence of an authority figure), a negative somatic reaction (e.g. stomach pain on an eve of an exam) are all symptoms rather than the cause of present problems. The cause is seen as the memories of unprocessed life events that are activated in the present. This view of psychological pathology is the theoretical core of EMDR therapy and guides the clinician in his understanding of the client, his formation of a treatment plan, and the way he builds his therapeutic interventions.

In an EMDR session, standardized procedures and protocols are used to access a memory that is relevant to the current difficulty, and brief applications of the bilateral stimulation (eye movement, tactile stimulation, or auditory stimulation) are employed according to standardized procedures and protocols. Session transcripts (Shapiro, 2001, 2002; Shapiro & Forrester, 1997) indicate that processing generally occurs through a rapid progression of intrapsychic connections in the session as emotions, insights, sensations, and memories surface and change with each new set of bilateral stimulation. This is viewed in the AIP model as the linking in of the targeted memory with adaptive information, enabling the client to progress through the appropriate stages of affect and insight regarding such issues as (1) appropriate levels of responsibility, (2) present safety, and (3) the availability of future choices.

EMDR processing is understood to involve the forging of new associations and connections enabling learning to take place with the memory then stored in a new adaptive form. Once that happens,

the client can see the disturbing event and himself from a new adaptive perspective. This new perspective does not carry with it the negative cognitions, affect and somatic sensations that were central to his previous maladaptive perception. Thus, the event stops having a negative impact on the client's self and world perception, and on his emotional and somatic experience. This processing which leads to new learning is at the core of the EMDR model and therapy. The three-pronged protocol used in EMDR therapy targets and processes the current situations that are triggering the disturbance, the experiences that have set the current symptom pattern in motion, and positive experiences and new information/education that are needed to overcome any lack of knowledge or skills.

### 3.1. The eight-phase treatment approach

The EMDR integrative psychotherapy approach uses an eight-phase protocol that guides the clinician in dealing with current psychological difficulties that are based on past negative events.

#### 3.1.1. Phase 1 – Client history

The clinician obtains general psychological background focusing on current strengths and difficulties, past events that are related to the current problems, situations in the present in which the problems are triggered, and positive future goals.

#### 3.1.2. Phase 2 – Preparation

The clinician prepares the client for the processing of memories by establishing a therapeutic relationship, offering psychoeducation regarding his difficulties as well as an explanation of the EMDR process, and teaching the client specific kinds of self-calming techniques to assist the client in maintaining a “dual awareness” during the subsequent processing sessions.

#### 3.1.3. Phase 3 – Assessment

The clinician helps the client to identify the details of the target memory, including the central image, the currently held negative cognition, the desired positive cognition, the currently felt emotion and physical sensation, and several baseline measurements.

#### 3.1.4. Phase 4 – Desensitization

The clinician follows and guides the client's processing of the disturbing memory of past or current target event. Positive future behavioral templates are also processed at a later stage. The processing includes changes in sensory, cognitive, emotional and somatic information. The goal of this phase is to bring the disturbance associated with the memory to the lowest possible level, and enhance personal growth through the development of insight and new perspectives resulting in a new sense of self and world view.

#### 3.1.5. Phase 5 – Installation

The clinician helps the client identify the current desired positive self-belief in relation to the memory, and strengthen it, thus facilitating the memory's integration in to adaptive memory networks.

#### 3.1.6. Phase 6 – Body scan

The clinician facilitates the client's identification and processing of any residual somatic sensation, with the goal being a complete somatic resolution.

#### 3.1.7. Phase 7 – Closure

The clinician gives the client feedback about the session and what to expect after its completion. The client is asked to keep a brief log of in between session psychological reactions. If needed, the clinician will use relaxation techniques to help the client stabilize before he leaves the session.

#### 3.1.8. Phase 8 – Reevaluation

The clinician assesses the client at the beginning of the following session focusing on treatment effects and evaluating what has happened in between sessions. This also includes re-accessing the previously processed target to evaluate maintenance for treatment effects and if any other aspects need additional processing. The information is used by the clinician to determine the next step(s) in the course of treatment.

### 3.2. The three-pronged protocol (past, present, future)

Following the completion of treatment planning (phase 1), and preparation and stabilization (phase 2), the EMDR treatment includes a three-pronged approach looking at relevant past, present, and future memories/templates. As part of that approach, the clinician helps the client identify the details of each memory/template (phase 3) and process it (phases 4, 5, 6). Based on the AIP model, the client is first asked to process past experiences (both early life and more recent) that were identified as contributing to the present difficulties. Then, the processing focuses on present situations that trigger the present maladaptive reactions (including negative thoughts, emotions, sensations and behaviors). Once the past and present memories are processed, the client is asked to bring up imagined adaptive behaviors to serve as memory templates for future functioning. This is done in relation to each of the previously defined present situations triggering dysfunctional reactions. These templates that include cognitive, emotional, somatic and behavioral information are then processed, in order to facilitate their integration into the adaptive memory network. The client may then be asked to face the challenging situations and return with feedback that helps the therapist decide about the need to continue the therapy.

## 4. Mechanisms of action

As with any form of therapy, the neurophysiological basis of EMDR is currently unknown, but several mechanisms of action may be interacting to achieve the therapeutic effects. A variety of mechanisms has been suggested that distinguish EMDR from traditional CBT practices. One such mechanism involves “extinction” versus “reconsolidation”. In EMDR therapy, the proposed mechanisms of action include the assimilation of adaptive information found in other memory networks that link into the network holding the previously isolated disturbing event (Solomon & Shapiro, 2008). After successful treatment, it is posited that the memory is no longer isolated, because it appears to be appropriately integrated within the larger memory network. This is consistent with recent neurobiological theories of reconsolidation of memory (Cahill & McGaugh, 1998; Suzuki et al., 2004), which propose that a memory, when accessed, can become labile and capable of being restored in an altered form. The EMDR process, involving the linking of new associations into previously isolated memory networks may involve the mechanism of reconsolidation. Hence, EMDR may involve different mechanisms than exposure therapies, where extinction is proposed to be a major mechanism (Craske, 1999; Lee, Taylor & Drummond, 2006; Rogers & Silver, 2002). While reconsolidation is thought to alter the original memory, extinction processes appear to create a new memory that competes with the old one.

Additional mechanisms may come into play during the assessment phase of EMDR treatment that pulls together various fragments of memory. While exposure therapies require the client to describe the memory in detail, no such requirement exists for EMDR therapy. Rather, in the assessment phase, the clinician assists the client in coming up with an image representing the negative memory, the presently held negative belief and desired positive

belief, emotions and sensations. Experiences that have been insufficiently processed may be stored in fragments (van der Kolk & Fisler, 1995). Therefore, the alignment of memory components may be a procedural element that facilitates processing. This procedure may activate and tap into memory networks holding different aspects of the negative experience, potentially helping the client reconnect disparate parts of the experience, helping the client make sense of the experience, and facilitate storage in narrative memory.

Cognitive restructuring is a procedural element that may contribute to EMDR's effectiveness. However, traditional cognitive therapies identify an irrational self-belief (negative cognition) and then deliberately challenge, restructure and reframe the belief into an adaptive self-belief (positive cognition) (Beck, Rush, Shaw & Emery, 1979). The EMDR assessment phase differs from cognitive restructuring methods in that there are no specific attempts to change or reframe the client's currently held belief. It is assumed that the belief spontaneously shifts during subsequent processing. Nevertheless, from an AIP perspective, forging a preliminary association between the negative cognition and more adaptive information that contradicts the negative experience can facilitate the subsequent processing by activating relevant adaptive networks.

Other mechanisms of action are inherent in the Desensitization and Installation phases. One possible mechanism of action may be mindfulness. During the desensitization phase of EMDR, clients are instructed to "let whatever happens, happen" and to "just notice" what is coming up (Shapiro, 1989, 1995, 2001). This is consistent with principles of mindfulness (Siegel, 2007). Such instructions reduce demand characteristics, and perhaps also assist clients in noticing what they are feeling and thinking, without judging. Research has shown that adapting a cognitive set in which negative thoughts and feelings are viewed as passing mental events rather than aspects of self (Teasdale, 1997; Teasdale et al., 2002) has a beneficial therapeutic effect. However, where meditation techniques generally ask the participant to return to the original focus (Tzan-Fu, Ching-Kuan & Nien-Mu, 2004), EMDR therapy clients are asked to simply "notice" the various associations as they arise.

Perceived mastery may be another important procedural element contributing to EMDR results. While exposure techniques require focused attention and discourage interrupting attention to the incident in order to prevent avoidance, EMDR therapy uses only short attention to the various associations that arise internally during the sets of eye movements. Consequently, during EMDR, clients may experience an increase in their sense of mastery in being able to go back and forth between experiencing the event, to notice what is happening and report on it. The client's coping efficacy may be enhanced along with their ability to manage stress, anxiety, and depression in threatening situations (Bandura, 2004). From an AIP perspective, this experience of mastery and efficacy becomes encoded in the brain as adaptive information available to link into memory networks holding dysfunctionally stored information.

Finally, while exposure therapies support a high level of disturbance when initially focusing on the disturbing event, as discussed above, the eye movements utilized in EMDR seem to result in an increase in parasympathetic activity demonstrated by a decrease in psychophysiological arousal, and a decrease in vividness and emotionality of negative material plus an increase in attentional flexibility. Perhaps such effects allow information from other memory networks to be able to link into the targeted network holding the dysfunctionally stored information (Shapiro, 1995, 2001), resulting in a transformation and then reconsolidation of the memory (Cahill & McGaugh, 1998; Suzuki et al., 2004). Further research is needed to explore these hypotheses and understand the specific, additive, and interactive effects of the different factors contributing to EMDR's effects.

## 5. Conclusions

EMDR is one of the state of the art psychotherapeutic approaches that has been paving the way in the field of psychotherapy. First and foremost, it is part of the Evidence Based Therapy group, that has pulled together the clinical and scientific aspects of psychotherapy decades after the Boulder Model's (Fagan & Warden, 1996) recommendations for evidence-based treatments. From its inception, EMDR practitioners have supported the development of clinical research, as evidenced by the more than 20 randomized studies in the treatment of trauma. While the AIP model provides EMDR therapy its theoretical basis, it is clear that the answers to the questions surrounding EMDR (and other therapies) lie in the brain. Consequently, approximately a dozen studies have investigated the neurobiological aspects of treatment and point to the fact that psychotherapy and brain research should be developing in tandem (Bossini, Fagiolini & Castrogiovanni, 2007; Pagani et al., 2007; Richardson et al., 2009).

EMDR is an integrative form of psychotherapy that incorporates elements compatible with diverse orientations. It has given the body a central place in therapy, while keeping cognitive, emotional and behavioral aspects in their important positions. Thus, it is integrating approaches that have focused on different aspects of human life, into one therapy. One of EMDR's major contributions is its ability to be both a focused and short psychotherapeutic therapy (for single episode trauma: Shapiro, 1989; Jarero, Artigas & Luber, 2011; Kutz, Resnik & Dekel, 2008) as well as a long-term integrative and broad form of therapy (for treatment of complex trauma, Korn, 2009). Along with the Positive Psychology approach, EMDR is a humanistic form of therapy that believes in the client's innate resources and the ability to use them in the service of personal development. The working assumption of EMDR is that the client is healing him/herself through the therapist-assisted stimulation of an innate information processing system (Shapiro, 1995, 2001). Last but not least, EMDR has been taught successfully in dozens of countries in all corners of the globe, to therapists of all cultures and backgrounds. The fact that it has been successfully utilized cross-culturally (Kim et al., 2010; Kavakcı, Kaptanoğlu, Kuğu & Doğan, 2010; Konuk et al., 2006; Uribe & Ramirez, 2006) may be pointing to EMDR's greatest contribution to the psychotherapy world and to human welfare.

In sum, EMDR views current problems as primarily based in memories that are dysfunctionally stored. Past experiences that have not been adequately processed are directly targeted and integrated within adaptive networks. EMDR is an evidence-based psychotherapeutic approach that is effective for trauma. However, EMDR is applicable to a wide range of disorders given that dysfunctionally stored memories cut across all clinical conditions (Mol et al., 2005; Obradović, Bush, Stamperdahl, Adler & Boyce, 2010). The EMDR integrative psychotherapeutic approach utilizes an eight-phase, three-pronged (past, present, future) protocol with the goal of liberating the client from the experiential contributors that set the foundation for the current pathology, and incorporating the full range of experiences and stored memories needed to bring the client to a comprehensive state of mental health.

Although the precise mechanisms of change are unknown, numerous randomized studies show that the eye movements utilized in EMDR are correlated with a desensitization effect. Studies have consistently shown an increase in parasympathetic activity, and a decrease in psychophysiological arousal. Given the studies demonstrating that the eye movement component appears to result in increased attentional flexibility and memory retrieval, perhaps the lowering of arousal may enable adaptive information from other memory networks to link into the network holding the dysfunctionally stored information. This can result in an adaptive reconsolidation of the memory. However, as with other

forms of psychotherapy, further brain research is needed to determine the exact biological underpinnings of the therapeutic effects. Additional research is needed to determine the neurobiological foundation of the eye movements and the interactional effects of the different components of the EMDR treatment process. Given that EMDR therapy does not use homework, the consecutive day treatment can easily support these studies by reducing the time confounds generally encountered with other forms of therapy.

## Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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