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Is EMDR More Effective than Wait List Control and Treatment as Usual with Posttraumatic Stress Disorder Symptoms?

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Is EMDR More Effective than Wait List Control and Treatment as Usual with Posttraumatic Stress Disorder Symptoms?

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Abstract

The goal of my thesis was to replicate Chen et al. (2014) and to extend the study by comparing Eye Movement Desensitization and Reprocessing (EMDR) to Wait List Control (WLC) and Treatment as Usual (TAU) conditions. Effect size estimations for reduction in Posttraumatic Stress Disorder (PTSD) symptomatology was used to compare the effectiveness of the treatment and comparison conditions. A total of 34 studies were included in this meta-analysis. These studies included at least a PTSD outcome measure along with other outcome measures (i.e., depression outcome measures, anxiety outcome measures, or subjective distress outcome measures). Relevant time point posttest means and standard deviations were used to calculate Hedges's *g* using a random effects model. Favorable results were interpreted as a decrease in PTSD symptomatology. Significant results were reported for EMDR versus WLC on PTSD outcomes and EMDR versus TAU on PTSD outcomes. Both hypotheses were supported as EMDR was more effective at reducing PTSD symptomatology than both WLC and TAU. Limitations of this study included variations in the outcome measures in the 26 studies from Chen et al. (2014) and variations in effect size calculations because not every study reported means and standard deviations. The results of this study should not be generalized beyond the populations included in the selected studies in randomized controlled trial settings. Future research should focus on the efficacy of EMDR versus individual empirically-supported therapies, the effectiveness of EMDR with certain age groups, and the dose-response effectiveness of EMDR with different numbers of treatment sessions.

Keywords: eye movement desensitization and reprocessing, posttraumatic stress disorder, randomized controlled trial, wait list control, treatment as usual, meta-analysis

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Is EMDR More Effective than Wait List Control and Treatment as Usual with Posttraumatic Stress Disorder Symptoms?

The psychotherapeutic intervention known as Eye Movement Desensitization and Reprocessing (EMDR), which focuses on the reprocessing of traumatic memories with the help of bilateral eye movements, had a tumultuous beginning (Shapiro, 2018). EMDR was introduced by Shapiro in 1989, and she faced heavy criticism that focused on the methodology that EMDR studies used and on the lack of empirical support for EMDR (Herbert & Mueser, 1992; Rubin, 2003). The need for empirical support is something that is necessary for all psychotherapies. Given this, Rubin (2003) reviewed the history of EMDR and how EMDR changed due to the criticism that it received. Psychotherapy interventions understandably evolve as research about them is published.

EMDR primarily has been used to treat Posttraumatic Stress Disorder (PTSD). An individual might develop PTSD if they witness or experience a traumatic event or suffer severe injury (United States Department of Veteran Affairs [USDVA], 2019). Some of the traumatic events from which individuals might develop PTSD include among others: combat, a natural disaster, sexual assault, physical assault, or a car accident (USDVA, 2019). There are seven sets of criteria for PTSD in the *Diagnostic and Statistics Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013): (a) stressor, (b) intrusion symptoms (re-experiencing the traumatic symptoms), (c) avoidance (avoiding stimuli related to trauma), (d) cognition/mood alterations (there is an increase in negative thoughts or feelings following the traumatic event), (e) changes in arousal/activity (arousal and reactivity related to the trauma have worsened following trauma), (f) duration (the symptoms have occurred for more than 1 month). When studies

are conducted to assess the efficacy or effectiveness of a treatment for PTSD, the treatment's success is determined through the reduction of symptoms to below a clinical threshold (van der Kolk et al., 2007). This is the most consistent way to determine the effectiveness or efficacy of a treatment like EMDR for PTSD.

Since the initial criticism, researchers have shown that EMDR is an effective treatment for PTSD (Chen et al., 2014; Khan et al., 2018; Moreno-Alcázar et al., 2017). Compared to when the first critique of EMDR was published, there is now strong empirical support for the effectiveness of EMDR for treating PTSD (Herbert & Mueser, 1992). Some of this empirical support has come from meta-analyses. The increased number of meta-analyses focusing on EMDR show that there is a large base of empirical studies that focus on EMDR. Even with an established base of evidence, it is important to continue to expand the literature on EMDR; while criticism has waned, there are ongoing questions about components of EMDR (e.g., the eye movements) and the effectiveness of EMDR for the general population.

Replication is an important part of research and is something that has been promoted recently in psychology (Maxwell, Lau, & Howard, 2015; Simons, 2014). The pressure to publish positive findings has caused a replication crisis, which may cause researchers to use questionable practices to gain positive results (Simmons et al., 2011). The replication crisis in psychology was first introduced in the literature by Simmons, Nelson, and Simonsohn (2011), and it has gained more attention in recent years (Maxwell et al., 2015). The replication crisis is the lack of replication studies validating the findings of studies that produce positive results and Maxwell et al. (2015) successfully address what the issues are and how to fix them. Hence, it is important to ensure that studies are

replicated to verify their findings; thus, I chose to replicate Chen et al.'s (2014) well-cited study on the effectiveness of EMDR.

Chen et al. (2014) conducted a meta-analysis on the efficacy of EMDR in treating PTSD. Based on the other meta-analyses and systematic literature reviews, there have been enough randomized controlled trials (RCTs) in the literature since Chen et al.'s (2014) original study that a replication is warranted (Khan et al., 2018; Moreno-Alcázar et al., 2017; Wilson et al., 2018). Additionally, Chen et al. (2014) failed to disaggregate wait list control (WLC) conditions from treatment as usual (TAU) conditions. There is a need to verify if EMDR is still an efficacious treatment for PTSD after the inclusion of the additional studies. As the most comprehensive meta-analysis to date, Chen et al. (2014) is a good study to replicate with extension. The extension will include new RCTs since the time of Chen et al.'s publication in 2014. The current meta-analysis will also extend the methodology that Chen et al. (2014) used. In this thesis, I will be assessing RCTs that used EMDR and WLC, and RCTs that used EMDR and TAU.

The primary objective of this thesis was to determine if (1) EMDR has a favorable effect (operationalized as reduction of PTSD-specific symptoms) as compared to Wait List Control conditions, or

$$H_1: \text{EMDR } g < \text{Wait List Control } g$$

and if (2) EMDR has a favorable effect (operationalized as reduction of PTSD-specific symptoms) as compared to Treatment as Usual, or

$$H_2: \text{EMDR } g < \text{Treatment as Usual } g.$$

These hypotheses allow another assessment of whether EMDR is an efficacious treatment for PTSD through a meta-analysis that focuses on the use of EMDR to treat PTSD in RCTs.

Literature Review

I focused my research on EMDR as compared to WLC and TAU through a meta-analysis. To understand the purpose and scope of my study, it is vital to examine the history of and research on EMDR. The goal of this literature review was to provide a basic understanding of how EMDR was discovered, how it works, how it was received, what has changed since its initial development, and the current trends in the literature related to EMDR.

Discovery

EMDR was conceptualized in 1987 by Francine Shapiro, who was pursuing a PhD in clinical psychology and struggling to find a topic for her dissertation (Shapiro, 1989a; Shapiro, 1995). Unlike other psychotherapies, EMDR was a serendipitous discovery, which was uncommon for new psychotherapies and a point of contention for proponents of the established psychotherapies (Shaprio, 1989b). Shapiro (1989a) discovered the technique for EMDR as she was walked through a park burdened with disturbing thoughts and realized that they were disappearing and not returning; she hypothesized that this was due to the saccadic eye movements, which is the rapid movement of the eyes between two points placed on a similar plane, occurring while she focused on the disturbing thoughts. This discovery was the foundation for what would be later known as EMDR.

At the time of publication of the first study on EMDR, there only had been a handful of published studies about controlled clinical outcomes on PTSD (Shapiro, 2002). Studies on clinical outcomes of PTSD were not common until the late 1980s, as evidenced by Peniston's (1986) literature review. One could argue that EMDR was one of the reasons that there was an increase in clinical outcomes research (Shapiro, 2002). EMDR was a new psychotherapy, and it threatened the status quo of the established psychotherapies. EMDR quickly garnered the attention of psychologists, and it was one of the first treatments for PTSD that was empirically reviewed, which benefitted Shapiro (Shapiro, 2002). Following the publication of Shapiro's articles on EMDR, there were a large number of case studies, including the one conducted by Wolpe and Abrams (1991), that Shapiro in turn used to determine what the best procedures were for EMDR (Shapiro, 2002). By having EMDR empirically reviewed, Shapiro was able to design a procedure that worked for both therapists and clients.

Initial Clinical Process

When reviewing the procedure for EMDR first published by Shapiro (1989a) and the procedure for EMDR today (Shapiro, 2018), there are some notable differences; these will be addressed later in this literature review. Still, many of the key components of EMDR have remained the same and are important for understanding the controversy surrounding EMDR. In the first form of EMDR's procedures, participants were instructed to keep an awareness of at least one of the following: (1) an image of the traumatic memory, (2) "the negative self-statement or assessment of the trauma," or (3) their physical anxiety response (Shapiro, 1989a, p. 212). This part of the procedure was in preparation of the eye movements and meant to help the client focus. While the client

maintained an awareness of at least one of the previous cognitions, the therapist would ask the client to identify words (or feelings) that the client believed accompanied the traumatic image (Shapiro, 1989a). The client provided a Subjective Unit of Distress (SUD) rating, while they focused on the words, the image, and the physical location of the anxiety stressors (Shapiro, 1989a). This was important because as the sessions progress, the SUDs rating will determine whether the therapy was successful or not through the reporting of a lower SUDs rating (Shapiro, 1989a).

EMDR has only relied on a verbal report from the client in regard to the SUD rating. After the rating, the therapist would ask how the participant would prefer to feel (Shapiro, 1989a). The client was instructed to rate the validity of their statement through a seven-point scale (Shapiro, 1989a). This pertains to a later component of the treatment after the traumatic memory was no longer distressing, and the client and therapist install the preferred feeling. After supplying the rating, the client was asked to (1) visualize the traumatic image, (2) rehearse the negative belief, (3) focus on the physical feelings of anxiety, and (4) track the therapist's index finger visually (Shapiro, 1989a). This was where the eye movements and reprocessing of the traumatic memory occurred in EMDR. After each set of saccadic eye movements, the therapist asks the client to blank out the image and breathe deeply once, then the client was told to bring up the image again and connect it with the feelings from earlier, and give a SUDs rating (Shapiro, 1989a). This process was for evaluating whether or not the particular memory that was targeted for desensitization was properly processed or not.

Following the SUDs rating, the client was asked to rate the validity of the desired cognition on the same scale as earlier (i.e., a seven-point validity scale; Shapiro, 1989a).

This was in preparation for the next phase of EMDR. After rating the desired cognition, the client was asked to recall the traumatic image and the desired cognition (Shapiro, 1989a). Another set of eye movements begins, and this process is continued until the positive cognition is installed (Shapiro, 1989a). This was the procedure for conducting EMDR. There are other parts to EMDR, but these are the essential components. With this understanding of how EMDR was conducted during its early years following its discovery, we can now examine what psychotherapy outcomes research has found about EMDR.

Reception

When EMDR was created, psychologists were intrigued and skeptical of the new treatment. When reviewing the literature on EMDR and psychotherapy outcomes, there are four types of studies that are relevant: efficacy studies, effectiveness studies, component studies, and comparison studies.

Efficacy studies. In efficacy studies, participants are randomly selected and assigned to treatment or control groups. The goal of the researcher is to control all extraneous variables so that they ensure that their independent variable is the only factor influencing the dependent variable. When reviewing the literature on efficacy studies about EMDR, there is no definitive answer determining whether EMDR is efficacious or not. In the first ten years of EMDR, there was a large amount of research that showed EMDR was not an efficacious treatment (e.g., Devilly & Spence, 1999; Devilly, Spence, & Rapee, 1998; Jensen, 1994). One must read each of these studies to understand why they found EMDR to not be efficacious. A staple of EMDR efficacy research was Jensen (1994), who determined that EMDR was not effective in treating Vietnam combat

veterans. This was quite a claim to make considering that Shapiro (1989a) reported that EMDR worked with Vietnam combat veterans. This is why research is conducted, especially with new forms of therapy: to determine whether or not they are efficacious and if the therapy works for all populations.

Jensen (1994) was not the only one to publish results that did not support the efficacy of EMDR. In 1998, Devilly et al. found that EMDR was not as effective with a veteran population as Shapiro (1989a) claimed. Following their study in 1998, Devilly and Spence (1999) conducted a comparison of EMDR and a Cognitive Behavior Therapy (CBT) variant, *Trauma Treatment Protocol*. Devilly and Spence (1999) found that the CBT *Trauma Treatment Protocol* was more effective than EMDR and that those who received CBT *Trauma Treatment Protocol* better maintained their treatments gains than those who received EMDR. The critique of a new psychotherapy should be expected because it helps the creators refine it; this is an essential part of the scientific process. Even though Jensen (1994), Devilly et al. (1998), and Devilly and Spence (1999) determined that EMDR was not effective in treating combat veterans, these results showed Shapiro that she needed to make changes to EMDR to better serve veterans.

Against this backdrop, there were also efficacy studies of EMDR that showed EMDR was similar in efficacy to typical treatments. One such study was conducted by Rothbaum, Astin, and Marsteller (2005), who compared EMDR and Prolonged Exposure (PE) and determined that both were effective. This was not the only efficacy study that compared EMDR and PE. Another efficacy study that compared EMDR and PE, as well as relaxation training, was done by Stapleton, Taylor, and Asmundson (2006). They established that there was no difference in treatment efficacy between the three

treatments (Stapleton et al., 2006). Benish, Imel, and Wampold (2008) conducted a meta-analysis to determine if there was a difference among psychotherapies and did not find significant differences between EMDR, CBT, and Exposure Therapy. These findings were congruent with other studies such as Rothbaum et al. (2005) and Stapleton et al. (2006).

While some studies indicated that EMDR was either inefficacious or similarly efficacious to TAU, some supported the claim that EMDR was superior to TAU. One of the earlier empirical studies that supported EMDR was Carlson, Chemtob, Rusnak, Gelund, and Muroka (1998). Carlson et al. (1998) found that after three months those who received EMDR improved significantly compared to Biofeedback-Assisted Relaxation treatment and a control group. These results not only showed that EMDR was an efficacious treatment, but it also was better than another type of therapy used to treat PTSD. Another efficacy study that supported EMDR was Powers et al. (2002), which established that when comparing EMDR and Exposure plus Cognitive Restructuring, neither one was more effective in treating PTSD symptomatology. However, EMDR was significantly better in reducing depression and increasing social function (Powers et al., 2002). In a meta-analysis conducted by Khan et al. (2018), they compared studies that used EMDR and CBT and determined that EMDR was more effective in reducing PTSD symptoms and anxiety. However, there was no significant difference between EMDR and CBT in reducing depression symptoms, and at the three-month follow up, the treatment gains of EMDR were not as significant (Khan et al., 2018). A large portion of psychotherapy outcome research is focused on psychotherapies, but there is some research that compares psychotherapies to pharmacological interventions. One such study

was conducted by van der Kolk et al. (2018), which determined that EMDR was more effective six months after treatment as compared to Fluoxetine and a placebo pill.

EMDR has received mixed reviews from researchers in regard to its efficacy in the 30 years since its discovery. In reviewing the literature on efficacy studies of EMDR, there is ample evidence that supports EMDR as an efficacious treatment for PTSD. This does not mean that this area of research should not continue; it means that there is enough evidence in the field of psychotherapy outcomes to support EMDR as an efficacious treatment. The question remains, however, as to whether it is the most efficacious treatment available today.

Effectiveness studies. Effectiveness studies have also been used to research EMDR. The difference between efficacy studies and effectiveness studies is the level of control exhibited over the study by the researcher and whether or not there was randomization involved in the study. In effectiveness studies, the participants are not randomly selected or they are not randomly placed into treatment or comparison conditions; thus, the researcher does not try to control all of the extraneous variables. These studies are meant to reflect treatment in the "real-world," meaning that the results of the studies are representative of the general population and non-laboratory treatment contexts, therefore, the conclusions of the studies arguably can be applied more broadly.

Research on EMDR primarily has been focused on efficacy studies and there are not many effectiveness studies in the literature. One effectiveness study was conducted by Grainger, Levin, All-Byrd, Doctor, and Lee (1997), who discovered that EMDR produced significant reductions in distress levels. Grainger et al. (1997) reported that EMDR produced positive reductions in distress levels in "subjective aversive reactions to

hurricane related trauma" (p. 670). This showed that EMDR was effective in treating the general population, not just specific populations such as the ones in the efficacy studies. Lansing, Amen, Hanks, and Rudy (2005) found that police officers who developed PTSD from on-duty shootings presented positive clinical effects when treated with EMDR. While this is a very specific population, the results with this study might be useful for helping average individuals involved in shootings. For EMDR, it is important to expand the research its research base because psychotherapies must be successful in treating a variety of populations.

Two effectiveness studies were conducted retroactively as researchers used existing data already recorded to evaluate the effectiveness of EMDR and other psychotherapies. The first study was conducted by Brickell, Russell, and Smith (2015) using data from the United States military. The researchers established that among the treatments that they reviewed, EMDR was more effective in treating PTSD (Brickell et al., 2015). Before 2015, EMDR was not seen as effective in treating veterans consistently (Devilly & Spence, 1999; Devilly et al., 1998; Jensen, 1994). However, Brickell et al. (2015) showed that there was a change in the research. Given such variation in the literature, there is still a need to evaluate whether EMDR is an effective and efficacious treatment for veterans. The other study that was conducted retroactively found that the majority of participants who received EMDR had clinically significant improvements, and more individuals treated with EMDR no longer met the *DSM-5*'s criteria for PTSD as compared to those who received another type of psychotherapy (McLay et al., 2016). Effectiveness studies using existing archival data can be beneficial because they can allow for a larger sample that can produce better effects size estimates.

In an effectiveness study comparing EMDR and Trauma Focused CBT, both were effective in treating children with posttraumatic stress symptoms, but there were no significant differences between the two treatments (Diehle, Opmeer, Boer, Mannarino, & Lindauer, 2015). In addition, EMDR was not effective in completely reducing comorbid problems, whereas Trauma Focused CBT reported improvements with comorbid problems (Diehle et al., 2015). Having reviewed all of the effectiveness studies of EMDR, the majority of studies support EMDR as an effective treatment (Brickell et al., 2015; Grainger et al., 1997; Lansing et al., 2005; McLay et al., 2016), while only Diehle et al. (2015) determined that EMDR and Trauma Focused CBT were equally effective. Even with this evidence supporting EMDR as an effective psychotherapy, there remains a need for more effectiveness studies on EMDR because this is an area of research that has been overlooked.

Component studies. Component studies, in the case of EMDR, are where the original treatment is compared to a modified version of the original treatment. With EMDR, some of the component studies focused on the eye movements and the positive cognition component (Cusack & Spates, 1999; Pitman et al., 1996). These types of studies evaluated whether a particular component of the therapy is necessary in the procedure.

Pitman et al. (1996) conducted a component study in which the experimental group of EMDR participants were told to keep their eyes fixed, they were not allowed to move their head during the eye movement part of EMDR, and hand taps were used instead of eye movements. The results showed that the eye movements did not make a difference in the therapeutic outcome and that the fixed eye group did better than the

standard EMDR group, no differences were observed between the two treatments (Pitman et al., 1996). Other researchers studied whether eye movements were necessary to EMDR. Devilly et al. (1998) established that it was unlikely that the eye movements were necessary to the treatment process, which was contrary to the original claims by Shapiro (1989b). Together, Pitman et al. (1996) and Devilly et al. (1998) likely caused Shapiro (2018) to reconsider her view on the eye movements, as evidenced by changes in the third edition of the treatment manual. This shows that component studies are important to the scientific process because they help discern what parts of a therapy are necessary for its success.

A different component study conducted in 1999 by Cusack and Spates focused on the positive cognition and the evaluation of the positive cognition in EMDR. Between EMDR and the modified EMDR, both were effective in reducing PTSD symptoms, but there was no evidence that the positive cognitive component, which was removed from the experimental group, made a difference in treatment outcome (Cusack & Spates, 1999). Notably, Shapiro (2018) did not remove positive cognitions in the later editions of her treatment manual.

A meta-analysis conducted of component studies determined that overall, there was no difference between standard EMDR treatment and the dismantled EMDR treatments (Bell, Marcus, & Goodland, 2013). This raised the question of whether it is necessary to remove or modify the elements that the component studies evaluated. The meta-analysis conducted by Bell et al. (2013) showed that there is a need for more research to evaluate whether the various components of EMDR that have not been changed by Shapiro are necessary. This is primarily related to the positive cognitions

because Shapiro (2018) has made changes in regard to the treatment protocol involving the eye movements.

Comparison studies. Comparison studies are the comparison of two or more types of treatments. Some of the more prominent comparison studies that have been conducted have compared EMDR to PE, CBT, or Exposure Therapy. These are the three main psychotherapies to which EMDR has been compared because they are the other prominent psychotherapies used to treat PTSD. The studies involving PE and EMDR have indicated that there is no difference in the effectiveness of each treatment (Ironson, Freund, Strauss, & Williams, 2002; Rothbaum et al., 2005; Stapleton et al., 2006). This evidence supports that there may be no one treatment that is more effective than the others. However, psychologists continue to conduct research. After reviewing the literature, PE is the only treatment that always had parity with EMDR in comparison studies (Ironson et al., 2002; Rothbaum et al., 2005; Stapleton et al., 2006). This may mean that if PE is not working for an individual, then EMDR could be a good alternative or vice versa.

When reviewing comparison studies of EMDR and CBT, there have been mixed results. Devilly and Spence (1999) suggested that CBT is better than EMDR, while data from Davidson and Parker (2001) and Diehle et al. (2015) indicated that EMDR and CBT are equally effective. To further complicate matters, Khan et al. (2018) showed EMDR was more effective than CBT in reducing PTSD symptoms. One conclusion that can be drawn from these findings is that more research is needed to determine whether or not EMDR is effective as compared to CBT. A more concrete determination should be made,

mainly for the sake of practitioners so they know which treatment they should use to treat PTSD.

As mentioned earlier, Powers et al. (2002) conducted a comparison of EMDR and Exposure with Cognitive Restructuring and determined that there were no significant differences between the two treatments besides EMDR's reduction of depression and increase of social function. This study showed that when EMDR is compared to Exposure Therapy or a variant, the treatments are likely of equal effectiveness. Overall, further research on comparison studies are needed, primarily between EMDR and PE and EMDR and CBT because these are the two alternate therapies to EMDR used for treating PTSD, and results to date are mixed, overall.

EMDR: Critiques and Defenses

In addition to the numerous efficacy, effectiveness, component, and comparison studies, there exists a large number of critiques and defenses of EMDR. These articles mainly critique the methodology of EMDR studies or defend the methodology and results of EMDR studies. By evaluating the critiques and defenses of EMDR, this provides a new depth to the controversy surrounding EMDR.

Critiques. EMDR has not been without its critics. The debate about EMDR has gone beyond conducting research and towards researchers reviewing the published studies and critiquing them. These critiques have been countered with defenses from proponents of EMDR. In addition to reviewing the research on EMDR, attention should be given to the commentary that has been published on EMDR. One of the earlier critiques of EMDR was by Herbert and Mueser (1992), who argued that EMDR should be used sparingly until there were more methodologically sound studies. This critique

was valid considering that EMDR did not have a standard set of procedures until 1995. Pitman et al. (1996), Devilly et al. (1996), and Cusack and Spates (1999) questioned essential parts of EMDR in their component studies. Some of these component studies forced Shapiro to make changes to EMDR's procedures (e.g., the eye movements), though the positive cognitions and reframing components of EMDR were left untouched.

One of the more prominent critiques of EMDR was by Herbert et al. (2000). One of the issues that the researchers had with EMDR was that it was not being compared to efficacious treatments (Herbert et al., 2000). This may have been the case with some research; however, this was not entirely true as evidenced by Devilly and Spence (1999) and Carlson et al. (1998). Another concern of Herbert et al. (2000) was whether EMDR was truly effective or if its effectiveness was because of confounding variables. This is a valid concern and can be prevented by continuing to conduct research on EMDR using RCT designs (Davidson & Parker, 2001). By 2001, it was unlikely that confounding variables were the reason for the success of EMDR as evidenced by the treatment manuals about EMDR (Shapiro, 1995). Herbert et al. (2000) also raised a concern about various methodological issues, but this concern goes beyond EMDR, and was an issue that other psychotherapies dealt with (Greenwald, 1996b). To counteract such issues, researchers should be properly trained in the treatment that they are using and should have the necessary skills to conduct a study. Finally, Herbert et al. (2000) found no compelling evidence that EMDR was more effective than alternative treatments, and this was supported by Davidson and Parker (2001). In 2000, this may have been the case, but newer research has shown that EMDR is more effective as compared to CBT in treating

PTSD symptomatology (Khan et al., 2018). However, this is an area of research that can be further developed.

A study conducted by Taylor et al. (2003) found that Exposure Therapy was more effective than EMDR, but this is contradictory to the findings of Powers et al. (2002) who reported that EMDR and Exposure plus Cognitive Restructuring were equally effective. Most of the comparisons of EMDR focus on PE or CBT because these are the main therapies that are used to treat PTSD. However, with Exposure Therapy sometimes being used as a comparison to EMDR, more research is needed between Exposure Therapy and EMDR. This is mainly to determine if one treatment is better than the other for treating PTSD.

Defenses. In response to the various critiques, there have been a variety of commentaries that have been written in defense of EMDR. Some of these articles were direct responses to a critique or study, other times these defenses addressed an issue that opponents had identified. A quick review of the criticism that EMDR has faced could lead one to attribute the criticism of EMDR to its lack of integration with existing psychotherapy models, according to Terrence Keane, a Veterans' Affairs PTSD-expert (as cited in Russell, 2008). This is one way to explain the criticism that EMDR has faced. Another explanation would be the criticisms of EMDR were a typical reaction to a new form of treatment (Russell, 2008). It appears that an individual's opinion on the criticism of EMDR is influenced by their opinion of EMDR.

Greenwald (1996a) reviewed the early history of EMDR and what determined its success. According to Greenwald (1996a), two factors were important; one being the complexity of the client's case and the other being whether or not the therapist had been

trained in EMDR. There are some clients for whom treatments will not work because no single therapy can treat every disorder; this is true for EMDR. There may be some clients who try EMDR and find that it does not work for them. They will need to find a different therapy. Researchers also have determined that there is a strong relationship between the outcome of EMDR and treatment fidelity (Maxfield & Hyer, 2002). Maxfield and Hyer (2002) conducted a meta-analysis that aimed to evaluate if differences in study outcome were related to methodological differences. They evaluated the following factors: clearly defined target symptoms, reliable and valid measures, use of blind independent assessor, assessor's reliability, manualized, replicable, specific treatment, unbiased assignment to treatment, and treatment adherence (Maxfield & Hyer, 2002). The results of treatment adherence, which was the most important variable, were that the role of the therapist and the competence of the therapist had large effects on treatment outcome (Maxfield & Hyer, 2002). Therefore, there is some support for the claim that EMDR is most effective when the therapist is trained.

Devilly and Spence (1999), among others, have found that EMDR was not as effective three months after the conclusion of treatment. However, other research has shown that EMDR is effective three months after treatment (Carlson et al., 1998; Edmond & Rubin, 2004). This difference in the effectiveness of EMDR following the conclusion of treatment could be attributed to the different populations in each study. Researchers have established that the effects of EMDR have persisted for as long as six or nine months depending on when follow-ups were conducted (Carlson et al., 1998; van der Kolk et al., 2018). On average, there are likely long-term benefits to receiving EMDR. The goal with any type of treatment is that the effects will continue for an

extended period of time and that the client will be able to use the skills they learned to maintain the gains made in treatment.

Around 2008, it was noted that researchers were focusing less on researching the efficacy of EMDR and more on the hypothesized active mechanisms of EMDR (Russell, 2008). This shift occurred in the late 1990s and early 2000s as evidenced by Devilly and Spence (1999) and Davidson and Parker (2001). Most of the research focused on the eye movement component of EMDR. As mentioned earlier, this forced a change in EMDR. Shapiro (2018) changed her stance on the eye movements by saying that bilateral dual attention stimulation was needed instead of the eye movements. This change meant that eye movements were not the only bilateral dual attention stimulation that could be used, that alternating hand taps could be used instead. Shapiro (2018) acknowledged the results of research on this point and adjusted the procedures accordingly.

Resulting Modification

Between 1989 and 2018, EMDR went through some important changes, mainly the shift to bilateral dual attention stimulation. Other shifts included a change in the working theory for EMDR and the purpose of EMDR. The first model that Shapiro (2018) used for explaining the effects of EMDR was a desensitization model, but that changed with the development of the Adaptive Information Processing (AIP) model. The goal of the AIP model is to make sure that connections are made to the appropriate associations and that the traumatic experience is properly integrated into a positive emotional and cognitive schema (Shapiro, 2018). The AIP model is different from the earlier desensitization model of EMDR because the AIP model focuses on the reprocessing of the traumatic memories whereas the desensitization model focused on

desensitizing the traumatic memory (this model is why EMDR was called Eye Movement Desensitization early on). However, it should be noted that there is still no definitive theory for why EMDR works. According to Shapiro (2018), this is because the scientific community does not have sufficient knowledge of the brain to understand why EMDR works.

The changes that EMDR has undergone go beyond its working theory to the purpose of EMDR. In 1989, EMDR was focused on alleviating anxiety (Shapiro, 1989a). With the publication of the first treatment manual in 1995, EMDR shifted to focus primarily on treating PTSD (Shapiro, 2018). EMDR is now used to treat a wider range of disorders. Since new concepts tend to evolve over time, EMDR is no exception. As EMDR was researched more, it went through a series of changes to better serve the targeted population. In 1995, EMDR had three goals: (1) help the client learn from the past traumatic experience(s), (2) desensitize the client to any triggers that are irrational, and (3) help the client prepare for future situations that may be associated with the traumatic experience(s) or memory so that the client can excel (Shapiro, 1995). These goals are still the foundation of EMDR and help guide the practice of EMDR (Shapiro, 2018).

There have been a variety of changes that have been made to EMDR, but the overall therapeutic process or procedure of EMDR has not changed. Shapiro (1995) developed a series of eight phases for EMDR for therapists to use: (1) client history and treatment planning, (2) preparation, (3) assessment, (4) desensitization, (5) installation, (6) body scan, (7) closure, and (8) re-evaluation. These steps are important for the therapist and the client so as to inform both of the process and course of the treatment. An

important note that Shapiro (1995) made was that a therapist and client may spend multiple sessions in one phase, or they might complete multiple phases in a session; this all depends on the needs of the client. EMDR is designed for flexibility so that it can be used to the greatest effect to help the client. One should understand that each client is different, and this is why EMDR allows for flexibility because the approach needed for one client is different from another (Shapiro, 1995).

The Ongoing Debate

The effectiveness of EMDR as compared to other treatments remains in question (Ironson et al., 2002; Powers et al., 2002; Rothbaum et al., 2005; Stapleton et al., 2006). A definitive answer about the effectiveness of EMDR is needed. There is also a need for efficacy studies to evaluate the new treatment manual for EMDR (Shapiro, 2018). This will, in turn, spawn comparison studies and effectiveness studies. Replication also is important because it can help determine whether a study was conducted correctly or not, or if there were confounding variables. However, it is uncommon that replication studies are published, and this is something that needs to change in the field of psychology. Replication studies help validate findings. A knowledge gap exists in the understanding of the interaction of EMDR and how the brain works in conjunction with EMDR. There are a variety of areas with EMDR that should be explored, and my study addressed two of them; that is, I examined the effectiveness of EMDR compared to TAU and WLC, and I conducted a replication of Chen et al. (2014).

Entering the Debate

To understand the scope of my study, one should have an understanding of what a meta-analysis is and what its role has been in psychology. The first meta-analysis on

psychotherapy outcomes was conducted by Smith (1977), which was an analysis of over 400 studies' outcome measures for different psychotherapies. Meta-analyses allow researchers to analyze data in a way that they can compare the results from studies that previously would have been incomparable due to differences in how the data was reported. Smith (1977) was the first to use this method with psychotherapy outcome measures. Meta-analyses have become popular and are a useful tool for researchers. As seen with psychotherapy outcome meta-analyses, such as Chen et al. (2014) and Khan et al. (2018), a large number of studies can be synthesized. Meta-analyses are useful because they can help determine if a particular psychotherapy (e.g., EMDR) is efficacious or not through combining the results of all the studies in the meta-analysis.

With EMDR meta-analyses to date, there have been mixed results. Two meta-analyses showed that EMDR was effective against no treatment (Davidson & Parker, 2001; Moreno-Alcázar et al., 2017). In addition, researchers also have determined that there is no significant difference between EMDR and TAU (Benish et al., 2008; Davidson & Parker, 2001). Khan et al. (2018) conducted one of a few meta-analyses to definitively determine that EMDR was better than CBT. This indicated that more meta-analyses of EMDR are needed to determine the efficacy of EMDR compared to other treatments and WLC conditions. These studies also reflect that the individual studies on EMDR have produced mixed results from the research base as to whether EMDR is effective against other therapies or not.

Continuing the Work

EMDR has a complicated history, and it is important to understand why. To settle the debate surrounding EMDR, it is important that research on EMDR continues; this is

why I am conducting my study. In the literature, there has not been a recent meta-analysis that has evaluated EMDR as compared to WLC and TAU. However, there have been new published studies on EMDR that have not been included in other meta-analyses. In my study, I re-evaluated the literature on EMDR since the publication of Chen et al. (2014) to determine if there has been a change in the effectiveness between EMDR and WLC, and EMDR and TAU. EMDR has been reshaped by research, and it is important that this process continues to insure that EMDR is still effective and efficacious.

Method

Inclusion Criteria

The inclusion criteria for this meta-analysis were based upon the criteria used by Chen et al. (2014): (1) peer reviewed journal articles published between January 1989 and April 2019, the date was adjusted to include any new publications since 2011; (2) the studies used EMDR to treat patients (children, adolescents, and adults) with PTSD; (3) the studies met the requirements for a RCT set by the Cochrane Collaboration (Higgins & Green, 2011); (4) EMDR was administered by trained professionals (i.e., physicians, nurses, and psychotherapists); (5) the control patients received TAU or no treatment (i.e., they were put on in a WLC condition); and (6) the clinical outcome assessments included a sufficient statistical analysis of the effect size (i.e., “the mean, standard deviation, mean difference, sample size, *t* value, *F* value, odds ratio, or P value”); only the clinical outcome assessments approved by Chen et al. (2014) were accepted, any others were excluded (p. 2). Types of studies or publications that I excluded were duplicate publications, quasi-experimental studies, single-subject or single-group experimental studies, and qualitative studies (Chen et al., 2014). Due to the number of new studies that

are in the literature, I made the decision to forgo the analysis of the "gray" literature (i.e., studies that were not published in a journal) because it would have drastically increased the breadth of the current thesis.

My study diverged from Chen et al. (2014) because I expanded the time frame for studies that could be accepted, and I analyzed both WLC and TAU independently as well as jointly (whereas Chen et al. only did the latter). The reason why the beginning of the time frame was changed to 1989 from 1991, was to include the earlier studies published on EMDR. For my study, it was important to include all RCTs that have been published on EMDR and PTSD patients to verify the efficacy of EMDR. The other inclusion criteria were not adjusted so as to provide an accurate replication of Chen et al. (2014).

Information Sources

The databases that I searched in the systematic literature review were Google Scholar, Medline Plus, CINAHL, Science Direct, Pubmed, Cochrane, PsychINFO; in addition, I conducted reference list checking. As argued by Lemeshow, Blum, Berlin, Stoto, and Colditz (2005), it is better to have many databases rather than a few. By using seven databases, there was a higher chance of identifying and accessing potential articles for this study. I used the same number of databases as Chen et al. (2014); however, I used Google Scholar in place of Scopus because I did not have access to that search engine. Chen et al. (2014) used Google Scholar as a supplementary source in their research while I used it as a primary database. I did so because Google Scholar is one of the more comprehensive databases, but it was only used in addition to the other databases because of the caution that has been put on using Google Scholar, namely that Google Scholar

does not have full access to all of the journal articles that have been published (Boeker, Vah, & Motschall, 2013; Jean-François, Laetitia, & Stefan, 2013).

The search terms that I used were: “posttraumatic stress disorder,” “PTSD,” “eye movement desensitization and reprocessing,” “EMDR,” “randomized controlled trials,” and “RCTs.” I used these search terms with Boolean connectors “AND” and “OR,” to create the following search strings: “Posttraumatic stress disorder OR PTSD,” “eye movement desensitization and reprocessing OR EMDR,” and “randomized controlled trials OR RCTs.” The inclusion of RCT in the search string limited the search responses to literature pertaining to RCTs; Chen et al. (2014) did not do this. I conducted a full text search of peer reviewed articles when searching the databases so as to find as many useable studies as possible. I established the time frame of January 1989 to April 2019 to encompass all of the EMDR literature. Specific journals were not in the inclusion criteria because it would have limited the systematic search of the literature and it might have excluded potential studies.

Study Selection

I implemented a four-step process for screening studies for the meta-analysis: (1) the search of the determined databases for eligible studies, (2) review of the eligible studies’ titles and abstracts (exclusion of non-RCT studies), (3) full-text review of the eligible articles, and (4) inclusion of remaining articles in the meta-analysis (Chen et al., 2014). The screening process was similar to Chen et al. (2014), since this thesis was a replication with extension. I removed meta-analyses after the second screening step and checked reference lists, so as to include any studies that might not have surfaced in the systematic literature search. I evaluated the selected studies’ quality using the criteria

established by Brodaty, Green, and Koschera (2003) based upon the guidelines set by the Cochrane Collaboration (Higgins & Green, 2011). The quality rating system employed by Brodaty et al. (2003) evaluated the following areas of a study: design, subjects, outcomes, statistics, and results. A perfect score for a study would contain the following criteria: (1) the study was randomized, (2) there was a comparison group, (3) the study used a standardized diagnostic criteria, (4) all subjects were accounted for/withdrawals were noted, (5) the study was well-validated and reliable measures were used, (6) the outcome was objective, it was not influenced by participant bias, (7) statistical significance was considered, (8) adjustments for multiple comparisons were made and the comparisons were converted to a metric that allows for easy comparisons, (9) there is evidence of sufficient power, (10) there were blind ratings, and (11) there was a follow-up assessment six months or beyond (Brodaty et al., 2003; Higgins & Green, 2011). I evaluated each study on the listed criteria, and I determined whether studies were of good quality if they met seven or more of those criteria (they were of poor quality if they met five or less of these criteria; Brodaty et al., 2003).

Data Collection

Next, I evaluated the studies that were selected for the meta-analysis. I examined each study throughout the screening process and entered the data from the selected studies. I compiled the following data components into Table 1, and later included them in the Results section: the rating each study received based upon the rating scale used by Brodaty et al. (2003), the outcome the study used; and the intervention used in the study. I employed the same clinical outcomes for PTSD allowed by Chen et al. (2014), which included the Clinician-Administered PTSD Scale, PTSD Checklist, Child Report of

Posttraumatic Symptoms, self-reported Symptom checklist of the Structured Interview for PTSD, and Impact of Event Scale. The clinical outcomes for Depression that Chen et al. (2014) used and the current meta-analysis employed were the Hospital Anxiety and Depression Scale, Montgomery-Asberg Depression Rating Scale, Beck Depression Inventory, and Hamilton Depression Rating Scale. For Anxiety, the clinical outcomes accepted in this study were the Hamilton Anxiety Rating Scale, Beck Anxiety Inventory, and State-Trait Anxiety Inventory (Chen et al., 2014). For subjective distress, the approved outcome measurement was the Subjective Units of Distress Scale (Chen et al., 2014). These variety of scales that were stated above are outcome measurements that were accepted from the selected studies.

Statistical Analysis

I utilized Hedges's *g* to calculate individual study effect size, as well as the overall effect size of the meta-analysis (Chen et al., 2014). This was congruent with how Chen et al. (2014) conducted their statistical analyses of their data. If Hedges's *g* was not calculated in a study, it was calculated from reported inferential statistics (i.e., pre and post means for each group) using the Comprehensive Meta-analysis statistical package. I calculated the effect sizes to determine the following: (1) the overall effect of EMDR versus an aggregate effect size that combines WLC and TAU, (2) the effect of EMDR versus WLC, and (3) the effect of EMDR versus TAU. As a part of the variation from Chen et al. (2014), I used relevant time point data using posttest means and standard deviations to calculate Hedges's *g* (Peters & Mengersen, 2008). If posttest means and standard deviations were not available, I employed other inferential statistics. I assessed heterogeneity through an x^2 based *Q* test, where the p value > 0.05 meant there was a lack

of heterogeneity amongst the selected studies (Chen et al., 2014). I used a random-effects model in this meta-analysis because the populations included in the selected studies for the meta-analysis lacked similarity, and a random-effects model is more representative of real-world circumstances (Cooper, 2017; Cooper, 2018).

To determine if EMDR was effective in reducing the symptoms of PTSD, depression, anxiety, and subjective distress, I used the effect sizes, as calculated through Hedges's *g*, to determine if EMDR had a significant effect on reducing the listed symptoms (Chen et al., 2014). To clarify, a positive effect in relation to symptom reduction means that compared to the symptoms at the beginning of treatment, the symptoms at the end of treatment have diminished.

In replicating Chen et al. (2014), I conducted a series of sub-analyses through calculating Hedges's *g*, which were whether groups led by therapists with experience with EMDR were more effective than therapists without experience with EMDR, and if a shorter or longer treatment duration (shorter or longer than 60 minutes) was more effective in treating depression, anxiety, and subjective distress (all sub-analyses were calculated separately; Chen et al., 2014). I completed an additional set of analyses to evaluate "the effects of EMDR on symptoms of PTSD, depression, anxiety, and subjective distress in PTSD patients using unrestricted maximum-likelihood meta-regressions" (Chen et al., 2014, p. 15). Through these secondary analyses, I evaluated the relationship between the effect size of PTSD and participant age, publication year, sample size, and treatment duration (Chen et al., 2014). I also reviewed the same kind of relationships with the effect sizes of depression, anxiety, and subjective distress (Chen et al., 2014). I conducted these sub-analyses because my thesis is a replication with

extension of Chen et al. (2014). Therefore, it was important that I conducted the same analyses in an attempt to replicate the results published by Chen et al. (2014).

Publication Bias

Publication bias, or where the results of a study influence the decision to publish or not, has been an issue for researchers conducting meta-analyses (Joober, Schmitz, Annable, & Boksa, 2012). I estimated publication bias through a funnel plot, as this replicated the decisions of Chen et al. (2014). I calculated the odds ratios from the selected studies and evaluated using Egger's test, which assessed for funnel plot asymmetry (Chen et al., 2014). I calculated publication bias as a part of the replication of Chen et al. (2014) to determine if the results in the selected studies influenced the researcher's decision to publish their findings.

Results

I reviewed a total of 1,137 studies for this meta-analysis (Figure 1; includes duplicates). After the screening process, I included 34 studies in the meta-analysis, which consisted of the original 26 articles from Chen et al. (2014) and eight additional articles obtained for this thesis. I completed a full text review on a total of 36 articles, but I excluded two articles at this point because they did not use either a control group or the report results suitable for conversion to effect sizes. Of the 60 articles that received at least an abstract review, I excluded 10 because they did not use the desired outcome measures, 10 because they did not follow the RCT protocol outlined by Cochrane Collaboration, two studies lacked the required statistics, one study was outside of the timeframe, and I could not access one study (Higgins & Green, 2011). I excluded the remaining 1,077 because they did not use the relevant search terms outlined in the

method section of this thesis or they lacked RCT classification or desired outcome measures.

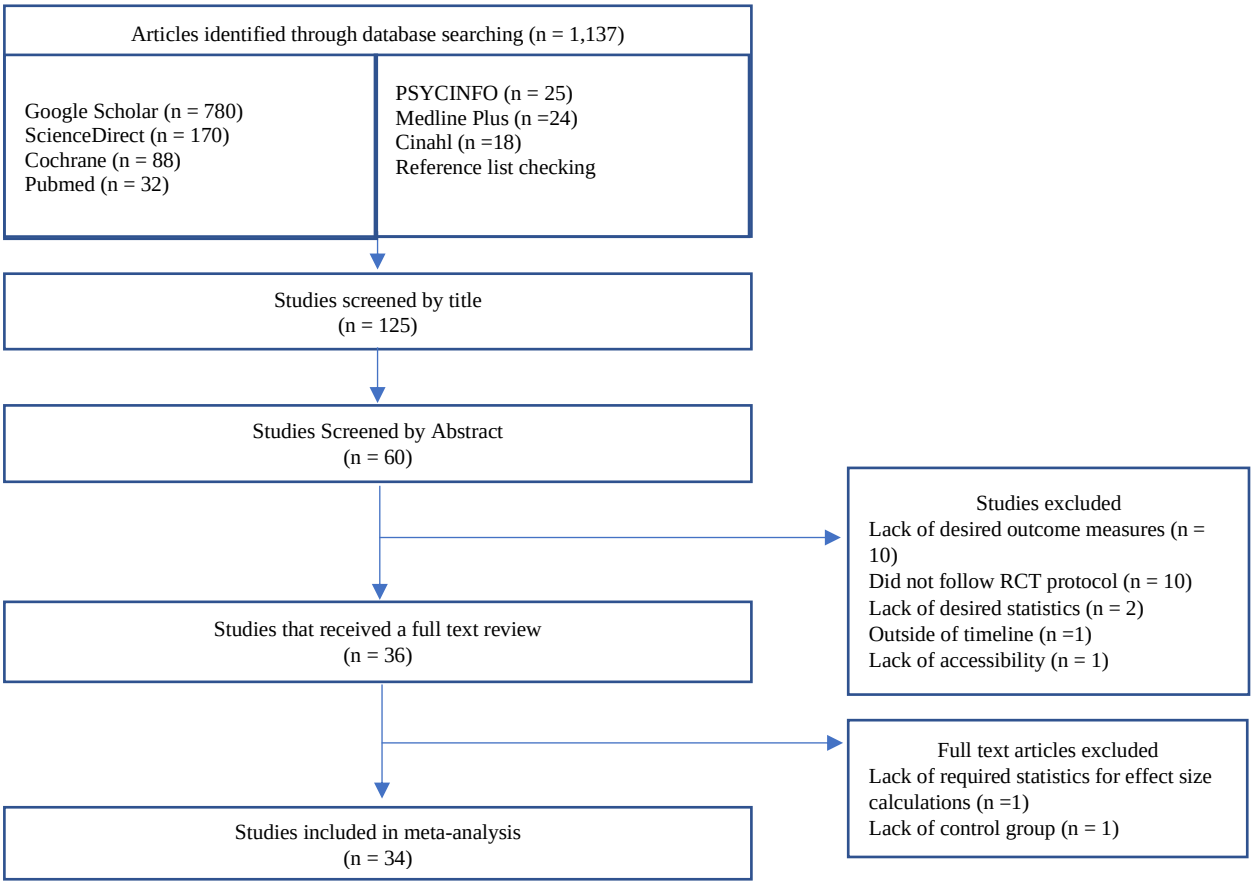

Figure 1: Study selection flow chart

Study Quality

The studies that I selected for the meta-analysis received a quality assessment using the criteria established by Brodaty et al. (2003) based upon the guidelines set by the Cochrane Collaboration (Higgins & Green, 2011). I conducted the assessment after data was pulled from the studies for the meta-analysis. Overall, the study's quality rating ranged from six to eight. For the eight new studies, the range was also six to eight, with most of the studies having a rating of seven. Overall, nine studies received a quality

rating of six, 16 studies received a rating of seven, and nine studies received a rating of eight.

Name/Year	Comparison groups	Total N	Quality Rating
Abbasnejad et al. 2007	EMDR vs. WLC	Not Reported	7
Acarturk et al. 2015	EMDR vs. WLC	29	7
Acarturk et al. 2016	EMDR vs. WLC	98	8
Ahmad et al. 2007	EMDR vs. WLC	33	7
Arnone et al. 2012	EMDR vs. TAU	Not Reported	6
Carlson et al. 1998	EMDR vs. WLC; EMDR vs. TAU	35	8
Chemtob et al. 2002	EMDR vs. WLC	32	7
Devilly & Spence 1999	EMDR vs. WLC; EMDR vs. TAU	23	7
Devilly et al. 1998	EMDR vs. WLC; EMDR vs. TAU	35	8
Dunn et al. 1996	EMDR vs. WlC	28	6
Hogberg et al. 2007	EMDR vs. WLC	21	6
Ironson et al. 2002	EMDR vs. WLC; EMDR vs. TAU	22	6
Jaberghaderi et al. 2004	EMDR vs. TAU	99	6
Jaberghaderi et al. 2019	EMDR vs. WLC	14	6
Jensen 1994	EMDR vs. WLC	25	6
Karatzias et al. 2011	EMDR vs. TAU	46	8
Karatzias et al. 2019	EMDR vs. WLC	29	7
Kemp et al. 2009	EMDR vs. WLC	Not Reported	7
Lee et al. 2002	EMDR vs. TAU	24	6
Lytle et al. 2002	EMDR vs. WLC; EMDR vs. TAU	45	7
Marcus et al. 1997	EMDR vs. WLC	77	7
Power et al. 2002	EMDR vs. WLC; EMDR vs. TAU	85	8
Rogers et al. 1999	EMDR vs. TAU	12	6
Rothbaum 1997	EMDR vs. WLC	18	7
Rothbaum et al. 2005	EMDR vs. WLC; EMDR vs. TAU	60	8
Sack et al. 2016	EMDR vs. WLC; EMDR vs. TAU	141	7
Scheck et al. 1998	EMDR vs. WLC	60	7
Taylor et al. 2003	EMDR vs. WLC; EMDR vs. TAU	30	7

van den Berg et al. 2015	EMDR vs. WLC	102	8
van der Kolk et al. 2007	EMDR vs. WLC; EMDR vs. TAU	76	7
Vaughan et al. 1994	EMDR vs. TAU	Not Reported	8
Wilson et al. 1995	EMDR vs. WLC	Not Reported	8
Wilson et al. 2001	EMDR vs. WLC	62	7
Yurtsever et al. 2018	EMDR vs. WLC	47	6

Table 1: List of studies included in meta-analysis with comparison, total number of participants, and quality rating

Efficacy Analyses

In comparing the relative efficacies of EMDR versus TAU and EMDR versus WLC conditions, I calculated Hedges's *g* (along with confidence intervals) from raw data extracted from each study included in the meta-analysis (Davies & Crombie, 2009; Grissom & Kim, 2005). Additionally, I used meta-regressions to model the influences of covariates (e.g., mean age at treatment, the number of treatment sessions) on resulting effect sizes for the comparisons reviewed (Higgins & Green, 2011).

Prior to these calculations, I considered publication bias. When assessing the funnel plot, I made the determination if there was publication bias through visual inspection, As seen in Figure 2, the funnel plot is symmetrical, which means that there was an absence of bias. For bias to occur in a funnel plot, there must be more dots (i.e., effect size odds) on one side of the funnel plot (Sterne et al., 2005). In the case of this funnel plot, it appeared symmetrical, indicating no substantial publication bias. For this reason, no corrections were made in subsequent analyses.

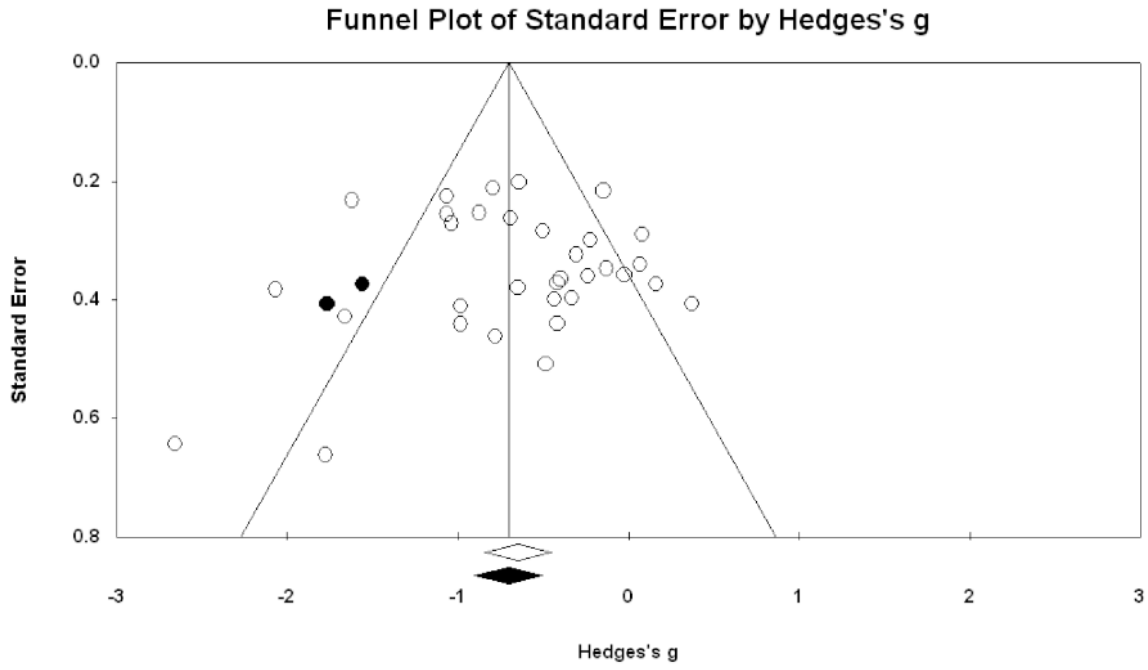

Figure 2: Funnel plot assessing publication bias in studies selected for meta-analysis.

In the analysis of EMDR versus WLC in promoting symptom reduction across all symptom outcomes considered (i.e., PTSD symptoms, depression, symptoms, anxiety symptoms, and subjective distress; n = 26), EMDR was more effective than WLC. Hedges's *g* was -0.767 ($p < .001$; 95% CI [-0.981 and -0.553]). I observed a substantial level of heterogeneity among the studies in EMDR versus WLC in all outcomes (Q = 79.7, p < .05, $I^2 = 68.6$). The range for the EMDR versus WLC individual study Hedges's *g* was -2.655 to 0.163, with only one study reporting a positive Hedges's *g*.

In the analysis of EMDR versus TAU in all outcomes (n = 15), there were significant results with the overall Hedges's *g* was -0.283 ($p < .001$; 95% CI [-0.561 and -0.005]; see Figure 4). The range of the calculated Hedges's *g* was -1.775 to 0.562 with four studies reporting a positive effect size. A high level of heterogeneity occurred among the studies in EMDR versus TAU in all outcomes ($Q = 2.01$, $p = 0.57$, $I^2 = 71.92$).

Outcome measures

There were significant results in the comparison of EMDR versus both TAU and WLC on PTSD outcome measures when these conditions were aggregated (Figure 3; n = 27). Here, Hedges's *g* was -0.656 ($p < .001$; 95% [-0.862 and -0.4499]). There was a high level of heterogeneity observed in the studies of EMDR versus TAU and WLC on PTSD outcome measures ($Q = 70.96$, $p < .05$, $I^2 = 63.4$). With regard to my first hypothesis, when comparing EMDR versus WLC based on PTSD-specific outcome measures, there were significant results (Figure 3). Hedges's *g* was -0.832 ($p < .001$; 95% CI [-1.105 and -0.559]). High levels of heterogeneity were observed in the analysis of EMDR versus WLC on PTSD outcome measures ($Q = 69.4$, $p < .05$, $I^2 = 74.1$). With regard to my second hypothesis, significant results were reported for EMDR versus TAU on PTSD-specific outcome measures (Figure 4; n =14). Hedges's *g* was -0.349 ($p < .05$; 95% CI [-0.689 and -0.0089]). A substantial level of heterogeneity occurred among the studies of EMDR versus TAU on PTSD outcome measures ($Q = 44.3$, $p < .05$, $I^2 = 70.7$).

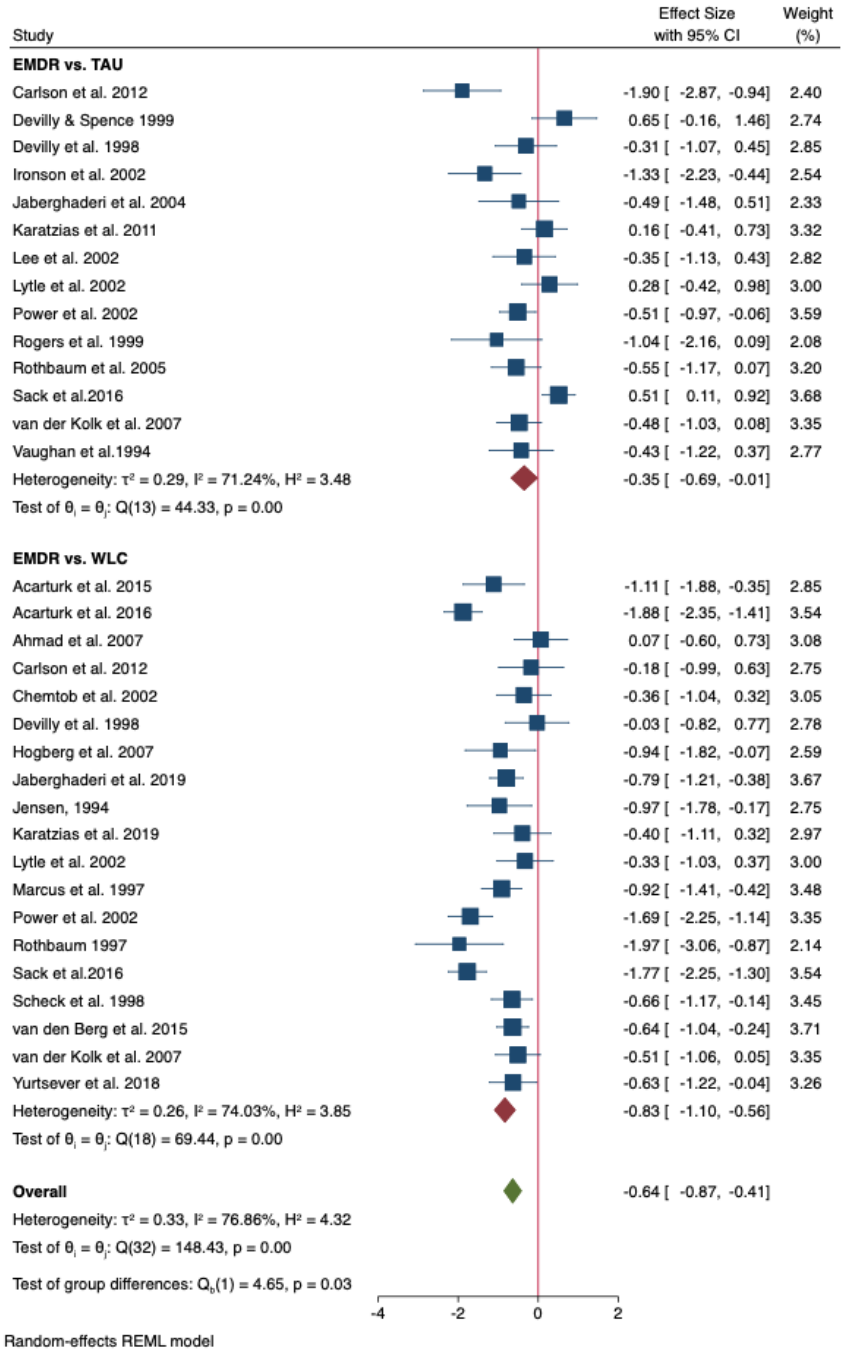

Figure 3: Forest plot of EMDR vs TAU on PTSD outcome measures and EMDR vs WLC on PTSD outcome measures

For EMDR versus TAU on Depression outcome measures (n = 12), Hedges's *g* was -0.101 (*p* = 0.608; 95% CI [-0.488 and 0.286]; see Figure 4). The analyses were non-significant with a range for Hedges's *g* being -0.915 to 1.65. I observed a low level

of heterogeneity in the studies of EMDR versus depression outcome measures (Q = 50.7, p = 0.608, I^2 = 78.3). In the analysis of EMDR versus TAU on Anxiety outcome measures (n = 8), Hedges's g was -0.282 (p = 0.159; 95% CI [-0.675 and 0.11]; see Figure 4). Results were not significant, and I observed a low level of heterogeneity in the studies of EMDR versus TAU on Anxiety outcome measures (Q = 18.8, p = 0.159, I^2 = 62.8). Nonsignificant results were reported for the comparison of EMDR versus TAU on SUD outcome measures (Figure 4; n = 5). Hedges's g was -0.676 (p = 0.0697; 95% CI [-1.407 and 0.054]). I observed low levels of heterogeneity in the studies of EMDR versus TAU on SUD outcome measures (Q = 14.2, p = 0.0697, I^2 = 71.8).

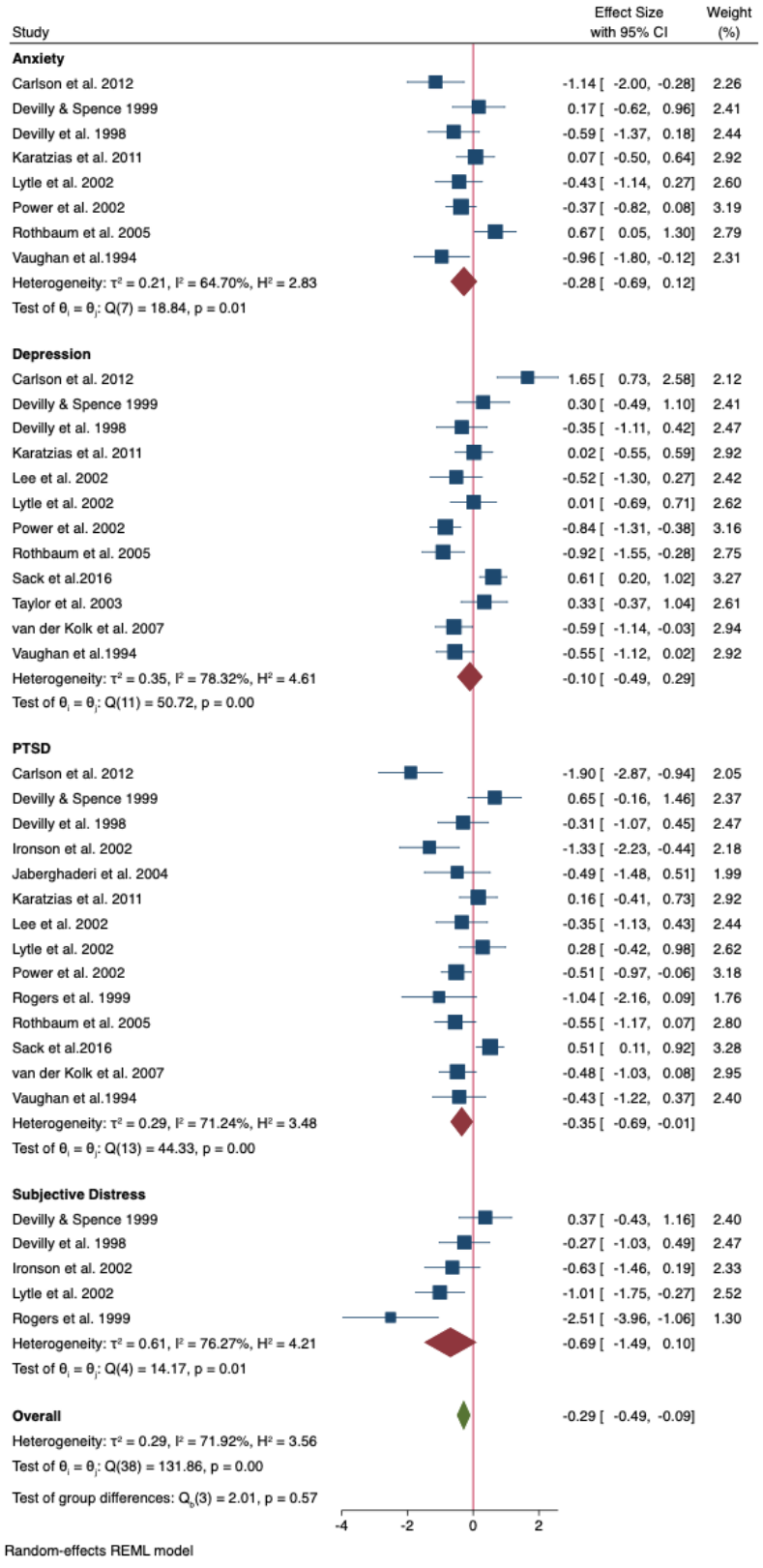

Figure 4: Forest Plot of EMDR vs TAU on all outcome measures

TAU Outcome Measures and Therapist

As a part of the replication of Chen et al. (2014), I conducted a series of analyses involving the effect of therapist experience on the four outcome measures. When the effect size for therapists experienced with EMDR on PTSD outcome measures (g = -0.526) was disaggregated from the overall effect size for PTSD outcome measures (g = -0.349), the experienced therapists had a larger effect size. When the effect size for experienced therapists on Anxiety outcomes measures (g = -0.641) were disaggregated from the overall Anxiety outcome measure effect size (g = -0.282), the experienced therapists had a larger effect size as compared to the overall effect size. With experience and depression outcome measures, when disaggregated, experienced therapists (g = 0.0024) had a smaller effect size as compared to the overall effect size for Depression outcome measures (g = -0.101). Experience and SUD outcome measures also reported a smaller effect size for experienced therapists (g = -0.448) as compared to the overall effect size (g = -0.676).

Meta-Regression Analyses

I conducted the meta-regressions to evaluate the relationship between EMDR and age and also EMDR and the number of sessions. In the meta-regression analysis of EMDR and age, the regression coefficient was -0.0068 (p = 0.316; 95% CI [-0.0201 and .006507]). This showed that there was no significant correlation between EMDR and age. The meta-regression analysis of EMDR and the number of sessions yielded no significant effect as demonstrated by B = 0.0251 which had a lower CI of -0.2014 and an upper CI of 0.0783 (p = 0.247).

Discussion

The objective of my thesis was to determine whether EMDR was more effective than WLC and whether EMDR was more effective than TAU. This was an analysis that Chen et al. (2014) did not perform when they conducted their meta-analysis evaluating the efficacy of EMDR in treating PTSD. The two hypotheses that I made were that (1) EMDR would have a favorable treatment effect (operationalized as reduction of PTSD-specific symptoms) as compared to WLC with regard to PTSD-specific symptoms and if (2) EMDR would have a favorable treatment effect (operationalized as reduction of PTSD-specific symptoms) as compared to TAU with regard to PTSD-specific symptoms.

The results of my thesis supported my first hypothesis that EMDR would have a favorable effect as compared to WLC. Further, the comparison of EMDR versus WLC on all outcome measures showed that EMDR was more effective at reducing PTSD-specific symptomatology as compared to WLC, as well as related symptoms such as depression, anxiety, and subjective distress. Additionally, my results also supported my second hypothesis that EMDR would have a favorable effect as compared to TAU on PTSD-specific symptoms. However, unlike WLC, this was not the case for related symptoms such as depression, anxiety, and subjective distress. I conducted an additional analysis as a part of the replication of Chen et al. (2014) that compared EMDR against both WLC and TAU. My results supported that EMDR was more effective than WLC and TAU on PTSD-specific outcome measures when they were combined.

The findings of this meta-analysis on PTSD symptomatology for EMDR versus TAU and WLC were congruent with Chen et al. (2014), where EMDR was more effective in reducing PTSD symptomatology. When TAU was disaggregated from WLC,

EMDR was significantly better in reducing PTSD symptomatology as compared to TAU independently and WLC independently. This was congruent with the findings of Powers et al. (2002) and Khan et al. (2018). For the other outcome measures, only EMDR versus TAU results were reported in the results section while the EMDR versus WLC are located in Appendix. No other significant results were found with EMDR versus TAU on Anxiety, Depression, or Subjective Distress outcome measures. These findings were congruent with the literature on EMDR versus TAU on Anxiety, Depression, and Subjective Distress outcome measures (Diehle et al., 2015; Khan et al., 2018).

In the sub-analyses that I conducted involving therapist experience and outcomes measures, only two out of the four analyses yielded effect sizes (for the experienced therapist versus the outcome measure) that were larger than the overall EMDR versus selected outcome measure. Experienced therapists showed that they were more effective in treating PTSD symptomatology and Anxiety symptomatology while they did not show that they were more effective in treating Depression and Subjective Distress as compared to the overall effect sizes for each outcome measure. Non-significant regression coefficients were reported for both EMDR and age, and for EMDR and the number of sessions.

Implications

In comparison to the studies cited in my literature review, my results were mixed. For example, my results did not align with the findings of Jensen (1994), who focused on EMDR versus WLC and found that EMDR was not more efficacious than a WLC condition. Carlson et al. (1998) conducted a study on EMDR versus WLC and, and contrary to Jensen (1994), the results demonstrated the efficacy of EMDR; a result that

aligned with my study. Taken together, my meta-analysis study conducted 30 years after the initial introduction of EMDR included a total of 26 studies that compared EMDR and WLC and demonstrated that EMDR is an efficacious treatment as compared to WLC.

In considering the other studies referenced in my literature review, the remaining efficacy studies were comparisons of EMDR versus TAU. My results in the comparison of EMDR versus TAU in all outcomes were significant. This finding is not incongruent with the findings of Devilly et al. (1998), Devilly and Spence (1999), Rothbaum et al. (2005), Powers et al. (2002), Stapleton et al. (2006), and Benish et al. (2008). However, the results of my meta-analysis were congruent with the findings of Carlson et al. (1998) and Khan et al. (2018). This means that in general, when EMDR is compared to all TAUs in all outcome measures (PTSD symptomatology, Depression symptomatology, Anxiety symptomatology, and Subjective Distress), EMDR was more effective in treating PTSD in participants in RCT settings. Further, and perhaps more importantly, my results also indicated an advantage of EMDR over TAU for PTSD-specific symptoms. This showed that EMDR was more successful in treating PTSD-specific symptoms than TAU, and that EMDR should be offered as the first treatment for individuals suffering from PTSD-specific symptoms instead of other efficacious treatments.

Limitations

As highlighted in Chen et al. (2014), there was a significant variation in the accepted outcome measures in their 26 studies and commented that this “affected the overall effect size and the results of the overall subgroup analysis” (p. e1003676). Chen et al. (2014) explained that the variation that occurred in the outcome measures affected the analyses that were completed, and if all of the studies reported the same outcome

measures, the results may have been different. Also, only studies that matched the inclusion criteria of Chen et al. (2014) were allowed in addition to the original 26 articles used by these researchers. This strict observance of acceptable outcome measures in this thesis eliminated 10 studies that could have been included in the meta-analysis.

Another limitation was the type of data available for the effect size calculations. There were issues surrounding calculating effect sizes based on *f*-values because the *f*-values were not relevant time-point analyses (Peters & Mengersen, 2008). This was why I made the decision to use relevant time-point analyses to calculate the effect sizes, but this could not be done with a small portion of the studies (Peters & Mengersen, 2008). Most of the issues involving calculating effect sizes involved studies from the original 26, but there were a few new studies that did not report the correct raw statistics for calculating a relevant time-point effect size (Peters & Mengersen, 2008).

Generalizability

When reviewing the overall effect sizes for both EMDR versus WLC and TAU in all outcomes, it appeared that the results could be extended to the general population because the studies included in this meta-analysis encompassed participants across the lifespan. However, when reviewing the individual studies in EMDR versus WLC in all outcomes, only eight out 15 studies with adults produced significant results ($p < .05$), one out of four studies with children produced significant results ($p < .05$), one of three studies with refugees had significant results ($p < .05$), and two out of three studies with veterans reported significant results ($p < .05$). When examining the studies from EMDR versus WLC in all outcomes individually, I concluded that more research is needed on children and refugees before results about EMDR versus WLC in all outcomes can be

generalized to those populations. The same can be said for veterans because only three studies were included. The only group that generalizations can be made about are adults because of the large number of studies that were done.

The individual studies of EMDR versus TAU in all outcomes contained studies with participant populations of veterans, children, and adults. In each of the studies' populations, the results of this meta-analysis should not be generalized to adults, veterans, or children due to the lack of a majority of the studies reporting statistical significance in EMDR versus TAU in all outcomes. Further analysis of the effect sizes based on populations is needed to determine if EMDR is more effective than TAU and WLC in treating veterans, children, adults, and refugees.

Efficacy versus Effectiveness

As this thesis was a meta-analysis of RCTs, the findings of this thesis should not be generalized beyond the fact that EMDR is more efficacious than WLC and TAU in an RCT setting when considering PTSD-specific symptom reduction. It is important to remember that efficacy studies (RCTs) are randomized, where the participants are randomly selected and randomly assigned to treatment groups. It is also important to remember that effectiveness studies are where the participants are not randomly selected, or placed, and the researchers do not control for extraneous variables. The focus of my thesis was on efficacy studies and whether or not EMDR was an efficacious treatment. The term effectiveness was used to help explain that EMDR was more proficient at lower overall PTSD symptomatology as compared to WLC and TAU. My research reflects a strong literature base that shows that EMDR is an efficacious treatment, but more research is needed to determine if EMDR can be classified as an effective treatment. As

demonstrated in my review of the literature, there is strong support for the efficacy of EMDR, but not for the effectiveness of EMDR (Carlson et al., 1998; Powers et al., 2002; Khan et al., 2018). By focusing on effectiveness studies that compare EMDR against WLC and EMDR against TAU, the findings of such studies will help determine if EMDR can be used generally, not just with specific populations or groups. More effectiveness studies such as Grainger et al. (1997) and Diehle et al. (2015) should be conducted to help determine if EMDR is only an efficacious treatment or if it is both an efficacious and effective treatment for treating PTSD.

Future Research

Future research should focus on direct comparison studies of EMDR versus individual therapies to determine if EMDR is more efficacious against other manualized treatments. As seen with EMDR versus PE, the data has not determined if one therapy is significantly better than the other (Ironson et al., 2002). This extends to EMDR versus CBT because the research shows that there is no clear consensus on whether EMDR is more efficacious than CBT or not (Benish et al., 2008; Devilly & Spence, 1999; Khan et al., 2018). These studies demonstrate that more research should be conducted to determine if EMDR is more efficacious than CBT and PE because there is no large base of research that demonstrates otherwise.

Another area for future research is to explore if there is a relationship between treatment age and EMDR. This meta-regression analysis did not produce a significant result but warrants further research because it could be beneficial to know if a particular age group responds well to EMDR or not. In reviewing the range of ages in some of the studies included in this meta-analysis, there were ranges such as 16-62, 12-13, and 47-53

(Ironson et al., 2002; Jaberghaderi et al., 2004; Rogers et al., 1999). As seen in the above-mentioned ranges, the age of the participants in the studies ranged from one year to 46 years. By focusing on particular age groups, this would provide clinicians with a better understanding of whether EMDR is the right psychotherapy to use with their client.

Future research should also be conducted on the number of treatment sessions because this was a factor that varied among the selected studies. In the studies that were included in this meta-analysis, the number of treatment sessions ranged from one to 12 (Jaberghaderi et al., 2004; Rodgers et al., 1999). This range of treatments can impact research, and Shapiro (2002) has noted that more treatment sessions should be offered to provide a more comprehensive picture of the effects of EMDR. The number of sessions offered not only in EMDR, but also in other psychotherapies can vary in studies. Researchers should focus on either standardizing the number of sessions offered in a study or research should be conducted to determine what the best number of sessions are.

EMDR has been surrounded by debate about whether or not it is an efficacious psychotherapy or not. Even though the debate has quieted, it is still ongoing, as evidenced by studies evaluating the efficacy of EMDR. This thesis attempted to help combat the replication crisis by replicating and extending Chen et al.'s (2014) study. It also shows that EMDR is more efficacious in treating PTSD symptoms as compared to WLC and TAU. In addition, I found that EMDR was more efficacious compared to WLC on all outcomes and TAU on all outcomes. Research should continue to determine if EMDR is efficacious for individual populations. This thesis showed that EMDR is an efficacious treatment in an RCT setting.

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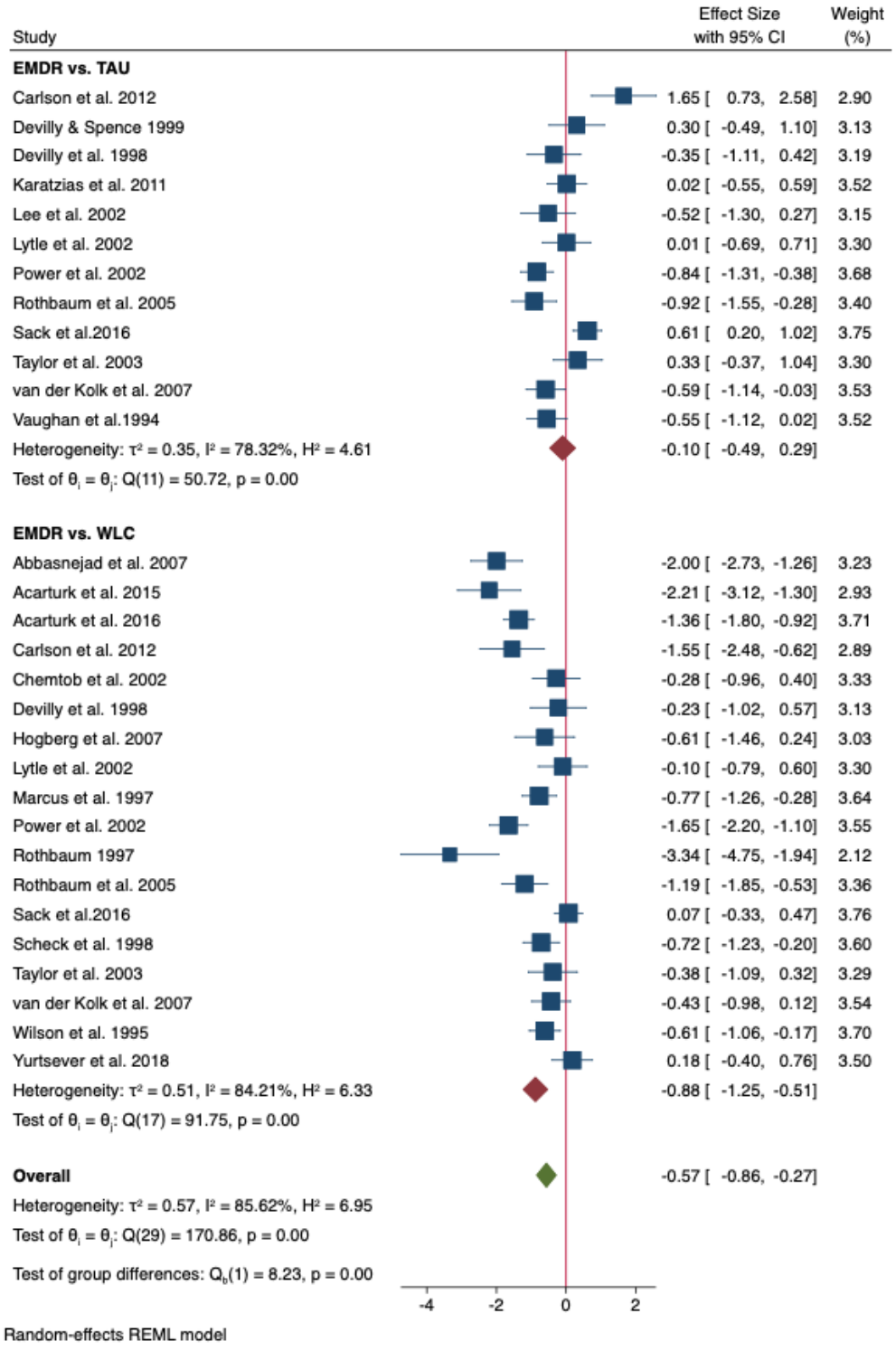
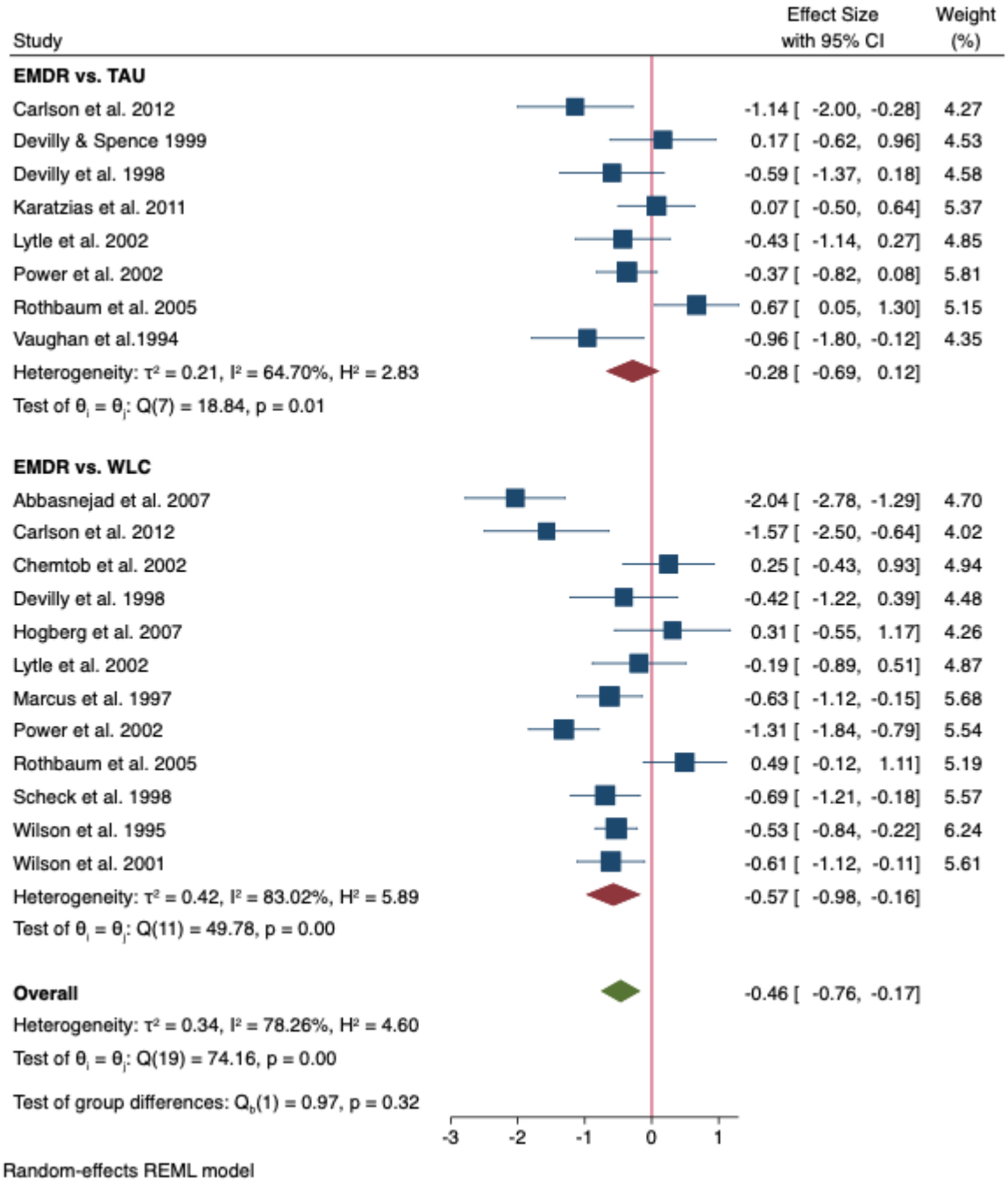
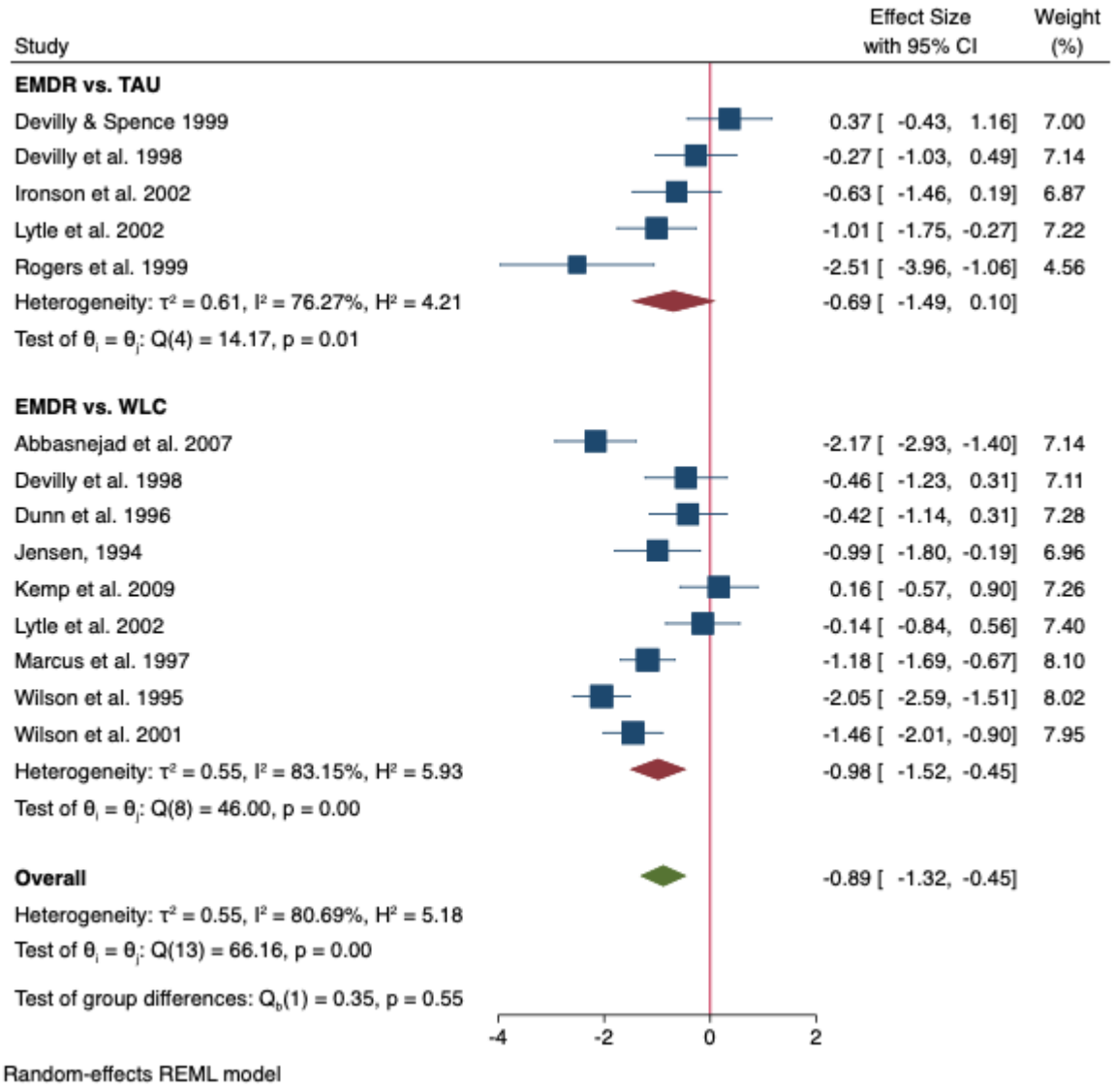
Appendix



Note: Forest plot of EMDR vs. WLC on depression outcomes, and EMDR vs. TAU on depression outcomes.



Note: Forest plot of EMDR vs. WLC on anxiety outcome measures, and EMDR vs. TAU on anxiety outcome measures.



Note: Forest plot of EMDR vs. WLC on subjective distress outcomes, and EMDR vs. TAU on subjective distress outcomes.