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Eye-Movement Desensitization Reprocessing (EMDR) Therapy for PTSD and Beyond



The Use of Eye-Movement Desensitization Reprocessing (EMDR) Therapy in Treating Post-traumatic Stress Disorder—A Systematic Narrative Review

Aim: There is an extensive body of research examining the efficacy of Eye-Movement Desensitization Reprocessing (EMDR) therapy in treatment of Post-traumatic Stress Disorder (PTSD). This systematic narrative review aimed to systematically, and narratively, review robust evidence from Randomized-Controlled Trials examining the efficacy of EMDR therapy.

Method: Eight databases were searched to identify studies relevant to the study aim. Two separate systematic searches of published, peer-reviewed evidence were carried out, considering relevant studies published prior to April 2017. After exclusion of all irrelevant, or non-robust, studies, a total of two meta-analyses and four Randomized-Controlled Trials were included for review.

Results: Data from meta-analyses and Randomized-Controlled Trials included in this review evidence the efficacy of EMDR therapy as a treatment for PTSD. Specifically, EMDR therapy improved PTSD diagnosis, reduced PTSD symptoms, and reduced other trauma-related symptoms. EMDR therapy was evidenced as being more effective than other trauma treatments, and was shown to be an effective therapy when delivered with different cultures. However, limitations to the current evidence exist, and much current evidence relies on small sample sizes and provides limited follow-up data.

Conclusions: This systematic narrative review contributes to the current evidence base, and provides recommendations for practice and future research. This review highlights the need for additional research to further examine the use of EMDR therapy for PTSD in a range of clinical populations and cultural contexts.

Keywords: eye movement desensitization and reprocessing (EMDR), EMDR therapy, trauma exposure, post-traumatic stress disorder, PTSD, review

INTRODUCTION

Eye-Movement Desensitization Reprocessing (EMDR) is a form of Psychotherapy developed by Shapiro (1995). Ostensibly, EMDR therapy is a trans-diagnostic, integrative psychotherapy that has been extensively researched and there is a growing empirical base for effective for the treatment of adverse life experiences, namely Post-traumatic Stress Disorder (PTSD) (Farrell, 2016). EMDR therapy utilizes a theoretical framework of Adaptive Information Processing (AIP), which posits that the primary source of psychopathology is the presence of memories of adverse life experiences inadequately processed by the brain (Felitti et al., 1998). There is much evidence examining the use of EMDR therapy as a treatment for trauma, however, much of this evidence centers upon non-Randomized Controlled Trials (RCTs).

This report intends to systematically, and narratively, review robust RCT evidence examining the efficacy of EMDR therapy.

METHODS

A systematic literature search of the databases was carried out, as outlined in **Figure 1**. After an initial scoping review of the literature, it became apparent that relevant meta-analyses of RCT studies were available. Therefore, the first systematic search gathered evidence of all systematic reviews and meta-analyses, which have synthesized and presented collective RCT evidence, examining the efficacy of EMDR therapy. All of the meta-analyses returned from this search specifically focused on the efficacy of EMDR therapy on PTSD symptoms - the most recent meta-analysis included papers prior to 2014. As a result, a second search was carried out to look at RCT studies investigating the efficacy of EMDR therapy on PTSD symptoms between 2014 and 2017, to ensure the most recent evidence was considered.

Search 1

A database search of published peer-reviewed systematic evidence relevant to the aim of this review was carried out, considering all relevant papers prior to April 2017 (**Table 1**). All databases were accessed using Northumbria University library's online subscription.

The Critical Appraisal Skills Programme tool (CASP, 2017a,b) for systematic reviews influenced the search strategy and was used to determine the quality of papers, and only those deemed of medium-high quality were included for review. Papers were excluded if they were not written in English, they reviewed non-Randomized-Controlled Trials (RCTs), they were not peer-reviewed, the review included RCTs including only children or adolescents, or EMDR therapy was not the focus of the report. A wildcard search strategy was utilized, to ensure that relevant papers were not excluded based on international spelling variations. A total of 24 papers were retrieved from the database search: ASSIA 2; CINAHL 2; Cochrane library 4; Medline 6; Psc Articles 1; PubMed 0; Science Direct 1; Web of Science 8 (**Figure 2**). Fifteen papers were removed after an initial title and abstract search, and five papers were removed as duplicates. Four

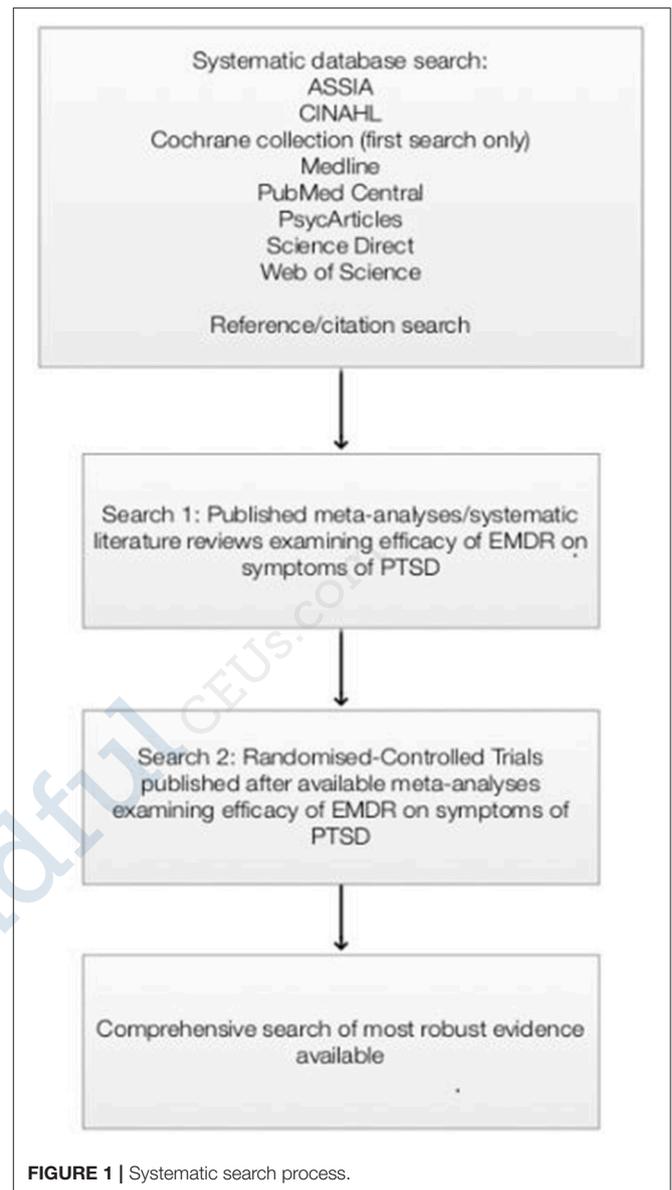


FIGURE 1 | Systematic search process.

papers were read in full, and two papers were further removed as one was not written in English, and one involved children and adolescents only. A reference and citation search was conducted on all relevant papers to maximize the identification of relevant studies, however, no further papers were included as a result of this. A total of two papers were included in this review (**Table 2**).

Search 2

Search 2 aimed to examine the evidence underpinning the use of EMDR as a form of therapy that has been published since 2014. All databases, search fields, language and exclusion criteria were identical to those search 1, however search terms and year of publication differed (**Table 3**). All databases were accessed using Northumbria University library's online subscription.

TABLE 1 | Search strategy utilized for both systematic searches.

Source	ASSIA CINAHL Cochrane library Medline PsycARTICLES Pubmed central Science Direct Freedom Collection Web of Science
Search field	ASSIA (AB Abstract) CINAHL (AB Abstract) Cochrane library (Title, abstract, keywords) Medline (AB Abstract) PsycARTICLES (AB Abstract) Pubmed central (Abstract) Science Direct Freedom Collection (Abstract, title, keywords) Web of Science (Title)
Language	English only
Exclusion	Non-English language Non-RCTs Non-peer reviewed papers Pilot studies/RCT protocol data Studies including children/adolescents only EMDR not focus of report
Search terms	(eye movement desensitization reprocessing OR EMDR) AND (systematic review OR meta-analysis)
Year of publication	All papers published prior to April 2017

The most recent meta-analysis included evidence prior to 2014, therefore it is imperative that studies between 2014 and 2017 are also considered. A second database search was therefore carried out, considering RCT evidence of studies examining the efficacy of EMDR therapy on PTSD symptoms between January 2014 and April 2017. As with search 1 papers were excluded if they were not written in English, they were not RCTs, they were not peer-reviewed, they were a pilot study or reported protocol data, they involved only children/adolescents under 18 years old, or EMDR therapy was not the focus of the report. A wildcard search strategy was utilized, to ensure that relevant papers were not excluded based on international spelling variations. Again, the Critical Appraisal Skills Programme tool (CASP, 2017a,b) for RCT evidence was used to determine the quality of papers, and papers were excluded if they did not satisfy CASP criteria. A total of 72 papers were retrieved from the database search: ASSIA 4; CINAHL 1; Medline 5; Psyc Articles 2; PubMed 3; Science Direct 10; Web of Science 47 (Figure 3).

Sixty-five papers were removed after an initial title and abstract search, and three papers were removed as duplicates. Four papers were read in full. A reference and citation search was conducted on all relevant papers to maximize the identification of relevant studies, however no further papers were included as a

result of this. A total of four papers were included in this review (Table 4).

RESULTS

Search 1

Two meta-analyses were included in this review (Chen et al., 2014, 2015). One was carried out in Taiwan (Chen et al., 2014) and one was carried out in China (Chen et al., 2015). One review focused on the use of EMDR therapy for adults with PTSD (Chen et al., 2015), whereas, one review included studies with both adults and children (5 of 26 RCTs involved children) (Chen et al., 2014). One meta-analysis focused on the efficacy of EMDR therapy compared to various interventions and control conditions (Chen et al., 2014) whereas, one study specifically focused on the efficacy of EMDR compared to CBT (Chen et al., 2015). Although this meta-analysis specifically compared EMDR therapy to CBT, many variants of CBT were included: image habituation training, trauma-treatment protocol, exposure plus cognitive reconstruction, prolonged exposure, stress inoculation training with prolonged exposure, imaginal exposure, brief eclectic psychotherapies, and “less standardized” CBT (Chen et al., 2015). Neither meta-analysis reported the length of follow-up for RCTs (Chen et al., 2014, 2015).

A total of 37 RCTs, and 1557 participants, were included over both meta-analyses. A total of seven RCTs were included in both of the reviews. It is evident that a vast number of comparator interventions and control conditions were used as comparisons to EMDR therapy. Furthermore, it is clear that there are severe inconsistencies between the outcome measures used to assess symptoms of PTSD, anxiety and depression, among other symptoms. Inconsistencies also persist in use of scale sub-sections, as well as the scale version used.

Both meta-analyses followed PRISMA reporting guidelines (Chen et al., 2014, 2015). Meta-analyses provided in-depth, transparent evidence of their systematic search strategy. When examining the quality of RCTs, both studies utilized the Cochrane collaboration tool (Higgins and Green, 2011). The guidelines stipulate that a research quality score of 6–10 indicates an acceptable level of quality. One meta-analysis did not give quality indicators but described the quality assessment process (Chen et al., 2015), whereas, one meta-analysis stated that research quality of RCTs varied from 6 to 8 (Chen et al., 2014). Homogeneity among studies was measured in both meta-analyses (Chen et al., 2014, 2015) and publication bias was measured using funnel plot (Chen et al., 2014, 2015), Egger’s test (Chen et al., 2014, 2015), and Begg’s test (Chen et al., 2015). One study calculated effect size using Hedge’s *g* and Cohen’s *d* (Chen et al., 2014), and one study calculated effect size using Standard Mean Difference (Chen et al., 2015).

Both meta-analyses reported EMDR therapy as being significantly more effective in reducing PTSD symptoms than control conditions and other interventions, including CBT. Chen et al. (2014) conducted a meta-analysis specifically looking at the efficacy of EMDR therapy on the symptoms of PTSD (Chen et al., 2014). Twenty-two of the 26 studies examined

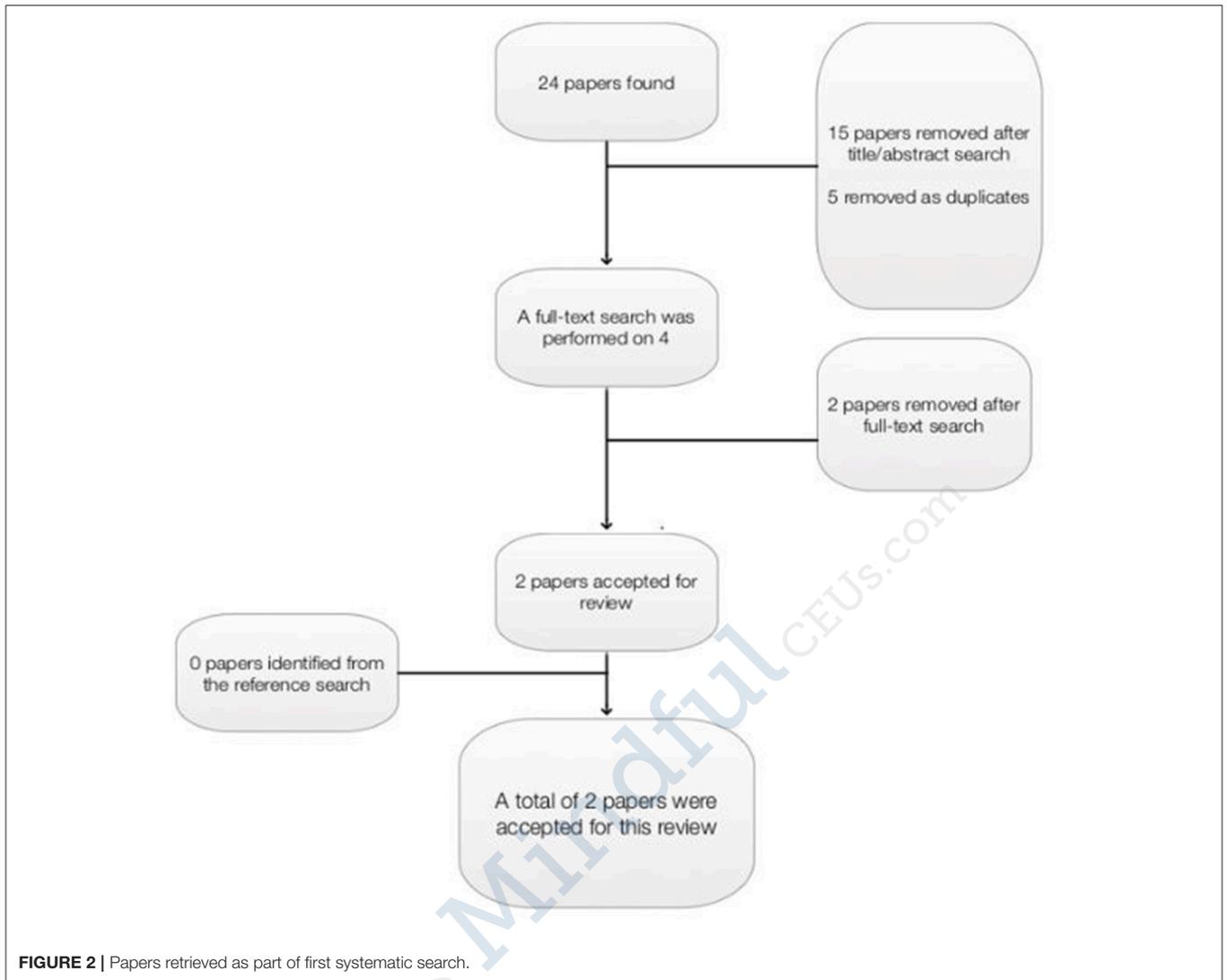


TABLE 2 | Characteristics of papers included in the first systematic search.

Author(s)	Aim	Design	Studies included (n =)	Total participants included (n =)	RCT quality assessment	Homogeneity measured	Publication bias	Effect size calculation	Location
Chen et al. (2014)	To examine the effects of EMDR on symptoms of PTSD, depression, anxiety, or subjective distress in PTSD patients	Meta-analysis	26	1,133	RCT requirements met by Cochrane collaboration (Higgins and Green, 2011)	Yes	Funnel plot Egger's test (Egger et al., 1997)	Hedge's <i>g</i> Cohen's <i>d</i>	Taiwan
Chen et al. (2015)	To examine the efficacy of EMDR compared to CBT for adults with PTSD	Meta-analysis	11	424	RCT requirements met by Cochrane collaboration (Higgins and Green, 2011)	Yes	Funnel plot Begg's test (Begg and Mazumdar, 1994) Egger's test (Egger et al., 1997)	Standard Mean Difference	China

TABLE 3 | Search strategy utilized as part of second systematic search.

Search terms	(eye movement desensitization reprocessing OR EMDR) AND (randomized controlled trial OR RCT) AND (post-traumatic stress disorder OR PTSD)
Year of publication	January 2014–April 2017

the effect of EMDR therapy on PTSD symptoms. The meta-analysis data reported that EMDR therapy significantly reduced PTSD symptoms overall ($p < 0.001$), with moderate effects sizes being evident ($g = -0.662$). In this instance, there were no reported publication biases, however, substantial heterogeneity was reported between studies.

Similarly, within the meta-analysis conducted by Chen et al. (2015) examining the efficacy of EMDR therapy to CBT, EMDR therapy was determined as being significantly more effective than CBT in reducing PTSD symptoms ($p = 0.05$) (Chen et al., 2015). No publication bias was reported, however, heterogeneity was high. Focusing on sub-scales of PTSD, EMDR therapy was also significantly more beneficial than CBT in reducing severity of intrusion ($p = 0.02$) and arousal ($p = 0.04$) (Chen et al., 2015). Only symptoms of avoidance failed to show a significant difference, and both EMDR therapy and CBT were comparable for this outcome ($p = 0.1$) (Chen et al., 2015). No publication bias was reported, however, heterogeneity ranged from moderate to high on all three sub-scales.

Further analyses within the meta-analysis carried out by Chen et al. (2014) revealed that group therapy carried out with experienced therapists showed a significantly larger effect size on PTSD symptoms than when carried out with an inexperienced therapist ($g = -0.753$; $g = -0.234$, respectively; $p = 0.007$) (Chen et al., 2014).

Chen et al. (2014) also investigated the efficacy of EMDR therapy on symptoms of depression and anxiety (Chen et al., 2014). Twenty of the 25 RCTs examined the effect of EMDR therapy on symptoms of depression, as the primary outcome. Findings from the meta-analysis report EMDR therapy as significantly reducing symptoms of depression overall ($p < 0.001$), with moderate effects being evident ($g = -0.643$) (Chen et al., 2014). Once more, no publication bias was reported, however, heterogeneity was moderate.

Sixteen of the 26 RCTs within the meta-analysis carried out by Chen et al. (2014) measured symptoms of anxiety as a primary outcome (Chen et al., 2014). EMDR therapy significantly reduced symptoms of anxiety ($p < 0.001$) with a moderate effect size being evident ($g = -0.640$) (Chen et al., 2014). No publication bias was reported, but heterogeneity was moderate. Finally, 12 of the 26 RCTs within the meta-analysis conducted by Chen et al. (2014) reported a significant reduction of subjective distress ($p < 0.01$) (Chen et al., 2014). A large effect size was evident illustrating the efficacy of EMDR therapy on subjective distress ($g = -0.956$) (Chen et al., 2014). Once more, no publication bias was reported but heterogeneity was moderate to high.

Chen et al. (2014) further reported that longer treatment sessions, of more than 60 min, were significantly more effective than shorter sessions for symptoms of depression ($p = 0.007$) and were also significantly more effective for symptoms of anxiety ($p = 0.045$). In this instance, homogeneity was reported over studies.

Summary Search 1

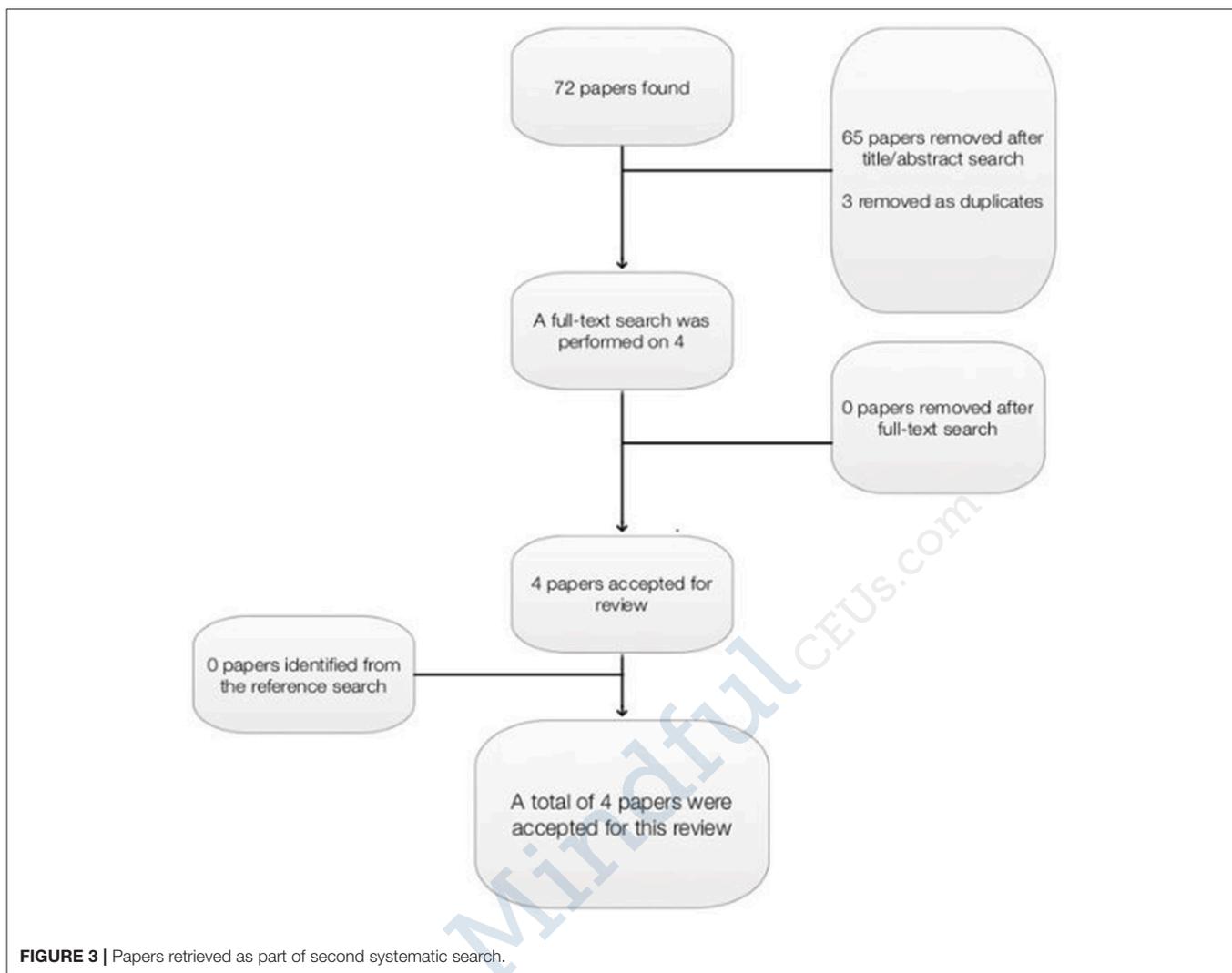
Both meta-analyses demonstrated the efficacy of EMDR therapy in treating symptoms of PTSD. Both studies concluded that EMDR therapy was more effective in treating symptoms of PTSD than various interventions and control conditions (Chen et al., 2014), including forms of CBT (Chen et al., 2015). Furthermore, Chen et al. (2014) demonstrated that EMDR therapy significantly reduced symptoms of depression, anxiety, and subjective distress (Chen et al., 2014). Chen et al. (2014) extrapolated further factors from RCT findings to determine that therapist experience of group therapy was a factor in reducing symptoms of PTSD. The meta-analysis identified that treatments lasting more than 60 min per session was a factor in improving symptoms of depression and anxiety (Chen et al., 2014).

There are however limitations to these studies. Both meta-analyses acknowledge that there is a lack of homogeneity between the RCTs reviewed, as variances exist between study design, interventions or control conditions used (including variations of CBT), sample sizes, and outcome measures including the use of various sub-scales or versions. The differences in study characteristics compromise the conclusions carried forward from these studies. Furthermore, one meta-analysis compares the efficacy of EMDR therapy to other interventions and control conditions, however, does not distinguish the differences of efficacy between these groups (Chen et al., 2014).

Search 2

All studies examined the efficacy of EMDR therapy with individuals diagnosed with PTSD (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016), with all but one study examining the impact of EMDR therapy on symptoms of PTSD (Acarturk et al., 2016; Carletto et al., 2016; ter Heide et al., 2016). Two studies examined the use of EMDR therapy with refugees diagnosed with PTSD (Acarturk et al., 2016; ter Heide et al., 2016), one study examined the use of EMDR therapy for symptoms of PTSD in patients diagnosed with multiple sclerosis (Carletto et al., 2016), and one study looked at effect of PTSD, depression and social functioning in patients with chronic psychotic disorders (de Bont et al., 2016). All studies used EMDR therapy as the intervention (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). Two studies used additional intervention therapies; prolonged exposure (de Bont et al., 2016) and relaxation therapy (Carletto et al., 2016). Two studies included a waiting list group as a control measure (Acarturk et al., 2016; de Bont et al., 2016) and one study utilized stabilization as a control measure (ter Heide et al., 2016).

The number, and length, of sessions differed over the studies. One study did not provide details of treatment sessions (Acarturk et al., 2016), one study provided ten 60-min sessions (Carletto et al., 2016), one study provided eight sessions but provided no



further detail (de Bont et al., 2016), and one study provided three 60-min sessions, followed by six 90-min sessions (ter Heide et al., 2016). Studies included between 50 and 155 participants (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016) and all studies reported a low dropout rate, with two of these studies reporting non-significant difference across conditions (Acarturk et al., 2016; ter Heide et al., 2016). All studies randomized participants to treatment groups (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). In all studies, the treatment groups were blind to the assessor only (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016) as EMDR therapy is a healthcare treatment administered by a professional, therefore a blind or double blind study is inappropriate.

Only one study described power analyses, and indicated 80% power to detect medium effect size (ter Heide et al., 2016). All studies utilized different outcome measures to report symptoms of PTSD, depression, anxiety, and others, with 19 different measures being used of the four studies. The time of assessment,

and follow-up, also differed between the studies. All studies reported pre-test measures, post-test measures were carried out between 1 and 12/15 weeks post-test, and follow-up also varied between 5 weeks to 6 months post-intervention. One study was carried out in Turkey (Acarturk et al., 2016), one was carried out in Italy (Carletto et al., 2016), and two were carried out in the Netherlands (de Bont et al., 2016; ter Heide et al., 2016).

All three studies directly measuring symptoms of PTSD found EMDR therapy significantly improved these symptoms (Acarturk et al., 2016; Carletto et al., 2016; ter Heide et al., 2016). One study reported EMDR therapy as being significantly more effective than another intervention therapy (Carletto et al., 2016), one reported EMDR therapy as being significantly more effective than a waiting list control-group (Acarturk et al., 2016), and one study found EMDR therapy to significantly improve some PTSD symptoms, but no more than a stabilization control group (ter Heide et al., 2016).

Carletto et al. (2016) utilized both EMDR therapy and relaxation therapy as intervention therapies to reduce PTSD

symptoms of individuals diagnosed with multiple sclerosis (Carletto et al., 2016). The study determined that 17 of 20 EMDR therapy participants no longer met PTSD diagnosis 12–15 weeks after treatment, and none of these 20 EMDR therapy participants met PTSD diagnosis at 6-month follow-up assessment. EMDR therapy was significantly more effective than relaxation therapy when considering post-treatment PTSD diagnosis ($p = 0.049$) (Carletto et al., 2016).

Acarturk et al. (2016) also concluded that EMDR therapy significantly reduced post-test PTSD diagnosis, compared to a waiting list control group ($p < 0.01$) (Acarturk et al., 2016). The study examined the efficacy of EMDR therapy for PTSD and depression among Syrian refugees. The results indicated that individuals in the waiting-list control group were 24.21 times more likely to be diagnosed with PTSD immediately post-test, compared to participants in the EMDR therapy group. Furthermore, the reduced likelihood of PTSD diagnosis remained significant at 1-month follow up, with individuals in the waiting-list control group being 23 times more likely to be diagnosed with PTSD, compared to EMDR therapy participants ($p < 0.01$) (Acarturk et al., 2016). Further analyses carried out by Acarturk et al. (2016) found EMDR therapy to significantly reduce the severity of PTSD compared to the waiting list control group ($p < 0.001$) and this effect was maintained over time. Specifically, there was a significant difference between EMDR therapy and control group for avoidance ($p < 0.01$), intrusion ($p < 0.01$), and hyper-arousal ($p < 0.01$). EMDR therapy also significantly improved reports of exposure of traumatic events compared to the control group condition ($p < 0.01$), and once more, this effect was maintained over time (Acarturk et al., 2016).

Similar to the study carried out by Acarturk et al. (2016), ter Heide et al. (2016) examined the efficacy of EMDR therapy for refugees diagnosed with PTSD (ter Heide et al., 2016). However, results were not as promising for the use of EMDR therapy in comparison. Over all of the reported primary and secondary outcomes, ter Heide et al. (2016) only reported significant improvement of trauma symptoms for both EMDR therapy and the stabilization control group ($p < 0.05$; $p < 0.05$), with no significant differences being reported between these conditions (ter Heide et al., 2016).

All four RCTs also considered the efficacy of EMDR therapy on symptoms of depression (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016), and three of these also considered its efficacy on symptoms of anxiety (Acarturk et al., 2016; Carletto et al., 2016; ter Heide et al., 2016). Carletto et al. (2016) identified that both EMDR therapy and relaxation therapy significantly improved anxiety symptoms ($p < 0.001$), depressive symptoms ($p < 0.001$) and mood ($p < 0.001$), although there were no significant difference between treatment efficacy (Carletto et al., 2016). EMDR therapy was also determined as being effective in reducing symptoms of depression and anxiety in the study carried out by Acarturk et al. (2016) (Acarturk et al., 2016). The study reported a significant difference between EMDR therapy intervention group and a waiting-list control group for the symptoms of depression ($p < 0.01$) and anxiety ($p < 0.01$), with both effects being maintained over time.

Although de Bont et al. (2016) utilized EMDR therapy as a treatment for individuals diagnosed with PTSD, the RCT did not report PTSD symptoms as an outcome measure (de Bont et al., 2016). Instead, de Bont et al. (2016) looked at the effect of EMDR therapy on symptoms of psychosis, depression and social functioning. The results presented by de Bont et al. (2016) are less favorable for the efficacy of EMDR therapy than other studies. The study reported prolonged exposure as being significantly more effective in reducing symptoms of depression than EMDR therapy (de Bont et al., 2016). The study showed that depressive symptoms for those in the prolonged exposure intervention, were significantly reduced compared to participants in a waiting-list control group at all follow-up points, and to EMDR therapy ($p < 0.05$) at both 6 month follow-up and over time (de Bont et al., 2016). Similarly, ter Heide et al. (2016) did not report statistically significant differences for symptoms of either depression or anxiety either over time, or between EMDR therapy and the stabilization control group (ter Heide et al., 2016).

Other outcome measures were also considered within these RCTs; paranoid thoughts (de Bont et al., 2016), social functioning (de Bont et al., 2016), functional assessment (Carletto et al., 2016), fatigue (Carletto et al., 2016), and quality of life (ter Heide et al., 2016). In addition to symptoms of depression, de Bont et al.'s (2016) main outcome measures were symptoms of psychosis and social functioning. This study demonstrated the impact of prolonged therapy exposure and EMDR therapy in reducing psychotic symptoms over the waiting list control condition (de Bont et al., 2016). EMDR therapy significantly reduced paranoid thoughts post-treatment ($p < 0.05$) and over time ($p < 0.05$), but interestingly not at 6-month follow up. Prolonged exposure was also significantly more effective in reducing paranoid thoughts compared to waiting list controls ($p < 0.05$) at all follow-up points. Neither EMDR therapy nor prolonged exposure significantly impacted auditory hallucinations or personal social performance compared to waiting list control group (de Bont et al., 2016). Carletto et al. (2016) also assessed the impact of EMDR therapy, and relaxation therapy, on functional assessment ($p = 0.001$) and fatigue severity ($p = 0.029$). Although both EMDR therapy and relaxation therapy were effective in improving these symptoms, there were no significant differences between reported between treatment groups (Carletto et al., 2016). ter Heide et al. (2016) examined quality of life, however, like other findings from this study, there were no significant outcomes for the efficacy of EMDR therapy, or for effects between the EMDR therapy intervention group, and the stabilization control group (ter Heide et al., 2016).

Summary Search 2

Four RCTs have been published between 2014 and 2017 examining the efficacy of EMDR therapy for individuals diagnosed with PTSD (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). EMDR therapy was reported as significantly improving PTSD diagnosis and PTSD symptoms, over time, compared to relaxation therapy and a waiting-list control group (Acarturk et al., 2016;

TABLE 4 | Characteristics of papers included in the second systematic search.

Author(s)	Aim	Sample	Intervention (participants)	Randomization	Blindness	Power analyses	Drop-out rate	Outcome measures	Time of assessment	Location
Acarturk et al. (2016)	To examine effect of EMDR on symptoms of PTSD and depression in Syrian refugees	70 adult Syrian refugees with a PTSD diagnosis	EMDR (<i>n</i> = 37) Waiting list (<i>n</i> = 33) No further information provided	Randomly allocated to treatment but no details given	Blind to outcome assessor	Not discussed	EMDR (<i>n</i> = 12) Waiting list (<i>n</i> = 16) Non-significant across conditions	BDI-II IES-R HTQ HSCL-25 M.I.N.I.	Pre-treatment 1-week post-treatment 5-weeks follow up	Turkey
Carletto et al. (2016)	To examine usefulness of EMDR and relaxation therapy as treatment for PTSD in patients with multiple sclerosis	50 adults diagnosed with multiple sclerosis	Ten 60-min EMDR sessions (<i>n</i> = 20) Ten 60-min sessions of relaxation therapy (<i>n</i> = 22)	Randomly allocated in 1:1 ratio	Blind to outcome assessor	Not discussed	EMDR (<i>n</i> = 5) Relaxation therapy (<i>n</i> = 3)	CMDI EDSS FAMS FSS HADS TAQ	Pre-treatment 12-15 weeks post-treatment 6-month follow up	Italy
de Bont et al. (2016)	To examine effects of prolonged exposure and EMDR for symptoms of PTSD in patients with chronic psychotic disorders	155 adults with chronic psychotic disorders	Eight EMDR sessions (<i>n</i> = 55) Eight sessions of prolonged exposure (<i>n</i> = 53) Waiting list (<i>n</i> = 47)	Randomly allocated to treatment but no details given	Blind to outcome assessor	Not discussed	EMDR (<i>n</i> = 11) Prolonged exposure (<i>n</i> = 6) Waiting list (<i>n</i> = 8)	BDI-II PRTS PSP PSYRATS SCI-SR-PANSS	Pre-treatment Post-treatment 6-month follow up	The Netherlands
ter Heide et al. (2016)	To examine safety and efficacy if EMDR in adult refugees with PTSD	72 adult refugees diagnosed with PTSD	Three 60-min; six 90-min EMDR sessions (<i>n</i> = 43) Twelve 60-min stabilization sessions (<i>n</i> = 45)	Blocked, simple randomization using a flipped coin	Blind to outcome assessor	80% power to detect medium effect size	EMDR (<i>n</i> = 7) Stabilization (<i>n</i> = 9) Non-significant across conditions	BREF CAPS HSCL HTQ WHOOOL-	Pre-treatment 2 weeks post-treatment 3-month follow up	The Netherlands

Carletto et al., 2016). EMDR therapy was also reported as significantly improving trauma symptoms (ter Heide et al., 2016).

All four RCTs also measured symptoms of depression and anxiety. EMDR therapy was reported as significantly reducing both depression and anxiety (Acarturk et al., 2016; Carletto et al., 2016). This effect was significant compared to control group (Acarturk et al., 2016) but there were no significant differences reported between EMDR therapy and relation therapy in reducing these symptoms (Carletto et al., 2016). Contradictory to this, one study did not report any differences in depression or anxiety symptoms between EMDR therapy and stabilization control group (ter Heide et al., 2016), and one study reported prolonged exposure as being significantly more effective in reducing symptoms of depression than EMDR therapy and waiting-list control group at post-test and over time (de Bont et al., 2016).

Finally, EMDR therapy and prolonged exposure therapies were reported as being an effective therapy to improve paranoid thoughts both at post-treatment assessment and over time (de Bont et al., 2016), but had not impact on auditory hallucinations or personal social performance compared to a waiting-list control group. Both EMDR therapy and relaxation therapy significantly improved functional assessment and fatigue severity (Carletto et al., 2016), however EMDR therapy was not effective in improving quality of life compared to a control stabilization group (ter Heide et al., 2016).

Study limitations were present. Similar to the meta-analyses reviewed, there was a lack of homogeneity across study design, intervention, control, outcome measures, and follow-up procedures. This makes it difficult to synthesize findings across studies, and reduces the impact of conclusions derived from the evidence. Furthermore, only one of the four studies reported power analyses which reduces the impact of the findings. Finally, only two of the four studies followed up at 6 months, therefore restricting the evidence of impact over time.

DISCUSSION

EMDR therapy is an empirically validated form of Psychotherapy (Shapiro, 2014), recommended by the World Health Organization to treat trauma (World Health Organisation, 2013). Meta-analysis and RCT data within this review evidence the efficacy of EMDR therapy in primarily treating symptoms of PTSD, depression and anxiety. Studies covered a wide range of countries including East and West affirming the effective delivery of EMDR therapy to differing cultures (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). EMDR therapy significantly improved PTSD diagnosis (Carletto et al., 2016), and significantly reduced symptoms of PTSD (Chen et al., 2014, 2015; Acarturk et al., 2016; Carletto et al., 2016), and other trauma symptoms (ter Heide et al., 2016). Specifically, this review also evidenced EMDR therapy as significantly reducing symptoms of depression (Chen et al., 2014; Acarturk et al., 2016; Carletto et al., 2016), anxiety (Chen et al., 2014; Acarturk

et al., 2016; Carletto et al., 2016), subjective distress (Chen et al., 2014), paranoid thoughts (de Bont et al., 2016), functional assessment (Carletto et al., 2016), and severe fatigue (Carletto et al., 2016). Despite the variations in methodology and analysis, the meta-analyses found EMDR therapy more effective than comparative interventions and control groups (Chen et al., 2014), resulting in PTSD below clinically significant levels. EMDR therapy was, however, more effective when delivered by more experienced therapists (Chen et al., 2015) and when sessions lasted more than 60 min (Chen et al., 2014). Overall, EMDR therapy was effective with a range of presenting problems and symptoms (Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). Low drop-out rates across all studies indicates EMDR therapy is well tolerated by clients, including in comparison to prolonged exposure (Ironson et al., 2002; Evans, 2003; Bisson and Andrew, 2013; World Health Organisation, 2013; Shapiro, 2014; Acarturk et al., 2016; Carletto et al., 2016; de Bont et al., 2016; ter Heide et al., 2016). There were methodological limitations of the studies, which compromises the quality of data examined in this review. Initially, many of the RCT studies were low-powered due to small sample sizes used. Furthermore, studies reported limited follow-up data, and follow-up data that was reported was often differed between studies, limiting evidence of long-term efficacy. These limitations have been reported in other meta-analytic evidence examining PTSD therapies more widely, and it was acknowledged that these issues similarly hindered conclusions derived from the synthesized evidence (Bisson and Andrew, 2013).

Another limitation of the evidence to date is the lack of homogeneity between RCT evidence, due to the inconsistencies in study design, intervention characteristics, sample, outcome measures and follow-up procedures in each study. This lack of homogeneity limits comparability between data, and ultimately impacts conclusions. Furthermore, none of the retrieved studies reported economic factors of EMDR therapy, and this is seldom reported in wider EMDR therapy literature. It is acknowledged that EMDR therapy can reduce healthcare costs, whilst maintaining patient care, due to substantial patient improvement in relatively short time periods (Shapiro, 2014). However, evidence is required to examine these economic factors, specifically in comparison to similar therapies such as CBT.

Search Limitations

A strength of the review is that all papers were reviewed using the Critical Appraisal Skills Programme (CASP) tools for systematic reviews or RCTs, and studies were not included if they did not meet CASP criterion. It is also acknowledged that this review is limited to RCT evidence specifically of adults receiving EMDR therapy, a specific population with definite characteristics, and therefore findings cannot be more widely generalized. There were some limitations to the first literature search. Only meta-analyses and systematic searches with, EMDR, in their title were included as part of the first search. This was due to the refinement of the search strategy, which initially included syntheses of multiple forms of therapy. However, by including

evidence looking at multiple forms of therapy, some syntheses included only one or two studies investigating EMDR therapy, and often did not specifically analyse the efficacy of EMDR therapy as a stand-alone treatment. Therefore, limited evidence could be retrieved from these papers, and a decision was made to only examine papers directly investigating the efficacy of EMDR therapy. The second systematic search examined RCT evidence only as RCT evidence is considered gold standard evidence for the efficacy of healthcare interventions (Evans, 2003), and alternative evidence was therefore excluded from this report.

CONCLUSION

As the global burden of psychological trauma continues unabated, the need for more research and investigation into treatment interventions that are both effective and efficient is essential. It is clear from this extensive, robust evidence that EMDR therapy is an effective treatment to improve diagnosis of PTSD, and reduce symptoms of PTSD, and other trauma-related symptoms. More RCT evidence is required to further enhance our collective understanding of PTSD and co-morbid symptoms.

Recommendations for Practice

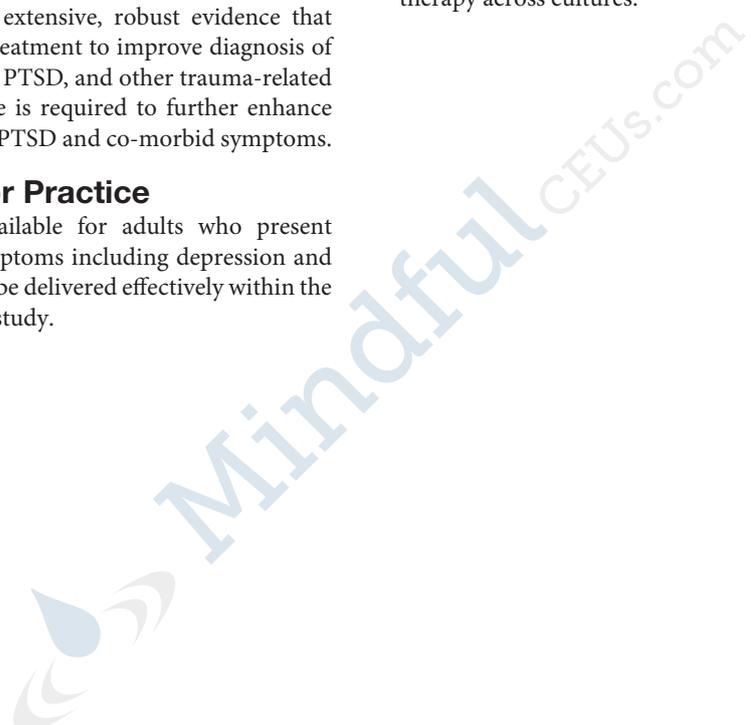
EMDR therapy should be available for adults who present with PTSD and co-morbid symptoms including depression and anxiety and EMDR therapy can be delivered effectively within the countries identified within this study.

Recommendations for Future Research

Further RCTs of EMDR therapy with larger sample sizes are required with a wide range of presenting mental health problems.

Additional research examining the differences between adult and child PTSD to ascertain which psychological treatment approaches for children and adolescents are more effective and efficient, as current evidence is weak. However emerging Practice-Based Evidence increasingly supports the utilization of Group Trauma Treatment Interventions (Jarero et al., 2013).

- More standardization of the normative outcome measures is required to facilitate comparison across studies.
- Studies need to include longitudinal evaluation beyond 6 months.
- Analysis is required of the economic benefits of EMDR therapy in comparison with other trauma-focused interventions.
- Comparative studies are needed of the efficacy of EMDR therapy across cultures.



EMDR beyond PTSD: A Systematic Literature Review

Background : Eye Movement Desensitization and Reprocessing (EMDR) is a psychotherapeutic approach that has demonstrated efficacy in the treatment of Post-traumatic Stress Disorder (PTSD) through several randomized controlled trials (RCT). Solid evidence shows that traumatic events can contribute to the onset of severe mental disorders and can worsen their prognosis. The aim of this systematic review is to summarize the most important findings from RCT conducted in the treatment of comorbid traumatic events in psychosis, bipolar disorder, unipolar depression, anxiety disorders, substance use disorders, and chronic back pain.

Methods : Using PubMed, ScienceDirect, and Scopus, we conducted a systematic literature search of RCT studies published up to December 2016 that used EMDR therapy in the mentioned psychiatric conditions.

Results : RCT are still scarce in these comorbid conditions but the available evidence suggests that EMDR therapy improves trauma-associated symptoms and has a minor effect on the primary disorders by reaching partial symptomatic improvement.

Conclusions : EMDR therapy could be a useful psychotherapy to treat trauma-associated symptoms in patients with comorbid psychiatric disorders. Preliminary evidence also suggests that EMDR therapy might be useful to improve psychotic or affective symptoms and could be an add-on treatment in chronic pain conditions.

Keywords: eye movement desensitization and reprocessing, PTSD, psychosis, bipolar disorder, chronic pain, unipolar depression, RCT

INTRODUCTION

Eye Movement Desensitization and Reprocessing (EMDR) is a psychotherapeutic approach developed in the late 80s by Francine Shapiro (Shapiro, 1989) that aims to treat traumatic memories and their associated stress symptoms. This therapy consists of a standard protocol which includes eight phases and bilateral stimulation (usually horizontal saccadic eye movements) to desensitize the discomfort caused by traumatic memories and the aim of the therapy is to achieve their reprocessing and integration within the patient's standard biographical memories (Shapiro, 2005). The effectiveness of EMDR therapy in treating Post-traumatic Stress Disorder (PTSD) has undergone the scrutiny of several meta-analyses (Van Etten and Taylor, 1998; Bradley et al., 2005; Davidson and Parker, 2005; Seidler and Wagner, 2006; Benish et al., 2008; Jonas et al., 2013; Chen et al., 2014, 2015); this led to the final recognition by the World Health Organization (2013) as a

psychotherapy of choice in the treatment of PTSD in children, teenagers, and adults¹. Moreover, the application of EMDR therapy is not restricted to the treatment of people with PTSD and its use is currently expanding to the treatment of other conditions and comorbid disorders to PTSD (de Bont et al., 2013; Novo et al., 2014; Perez-Dandieu and Tapia, 2014). In this context, it is important to note that traumatic events belong to the etiological underpinnings of many psychiatric disorders (Kim and Lee, 2016; Millan et al., 2017). In addition, a comorbid diagnosis of PTSD can worsen the prognosis of other psychiatric disorders (Assion et al., 2009). Therefore, investigation in EMDR therapy has increased beyond PTSD and several studies have analyzed the effect of this therapy in other mental health conditions such as psychosis, bipolar disorder, unipolar depression, anxiety disorders, substance use disorders, and chronic back pain. The aim of this systematic and critical review is to summarize the most important results of the available randomized controlled trials (RCT) conducted in this field.

METHODS

Using PubMed, ScienceDirect, and Scopus, we conducted a systematic literature search of studies published up to December 2016, which examined the use of EMDR therapy in other psychiatric disorders beyond PTSD. The search terms were selected from the thesaurus of the National Library of Medicine (Medical Subject Heading Terms, MeSH) and the American Psychological Association (Psychological Index Terms) and included the terms “EMDR,” “schizophrenia,” “psychotic disorder,” “bipolar disorder,” “depression,” “anxiety disorder,” “alcohol dependence,” “addiction,” and “chronic pain.” The final search equation was defined using the Boolean connectors “AND” and “OR” following the formulation “EMDR” AND “schizophrenia,” “psychotic disorder,” “bipolar disorder,” “depression,” “anxiety disorder,” “alcohol or substance dependence” OR “addiction,” “chronic pain.” The automatic search was completed with a manual snowball search using reference lists of included papers and web-based searches in an EMDR-centered library (<https://emdria.omeka.net/>). The search included English-published articles from 01/01/1997 to 31/12/2016 and did not include any subheadings or tags (i.e., search fields “All fields”). Furthermore, we performed a manual search of the references list of previous meta-analysis and the retrieved articles. Case reports, serial cases, unpublished studies, and non-randomized studies, were excluded from this systematic review. Due to the significant heterogeneity of the studies, a formal quantitative synthesis (i.e., meta-analysis) was not possible. Instead, a systematic review was conducted using the PRISMA guidelines as referenced above. Prisma 2009 checklist (Supplementary Datasheet) and flow chart (Figure 1), as well as the Jadad scale (Supplementary Table) for reporting RCT have been completed and included in the Supplementary Material.

¹http://www.who.int/mediacentre/news/releases/2013/trauma_mental_health_20130806/es/2013.

Inclusion Criteria and Exclusion Criteria

The final selection of the articles was carried out using the following criteria: (i) RCT published in peer-reviewed journals, (ii) in adult populations (over 18 years) that (iii) examined the use of EMDR therapy in different psychiatric disorders (as previously described). The criteria for exclusion were: (i) articles that did not contain original research (i.e., reviews and meta-analyses and (ii) quasi-experimental designs (single case and/or no control group). The studies were selected by Alicia Valiente-Gómez and discrepancies were resolved by Ana Moreno-Álcazar and Benedikt L. Amann.

RESULTS

EMDR Therapy in Schizophrenia and Other Psychotic Disorders

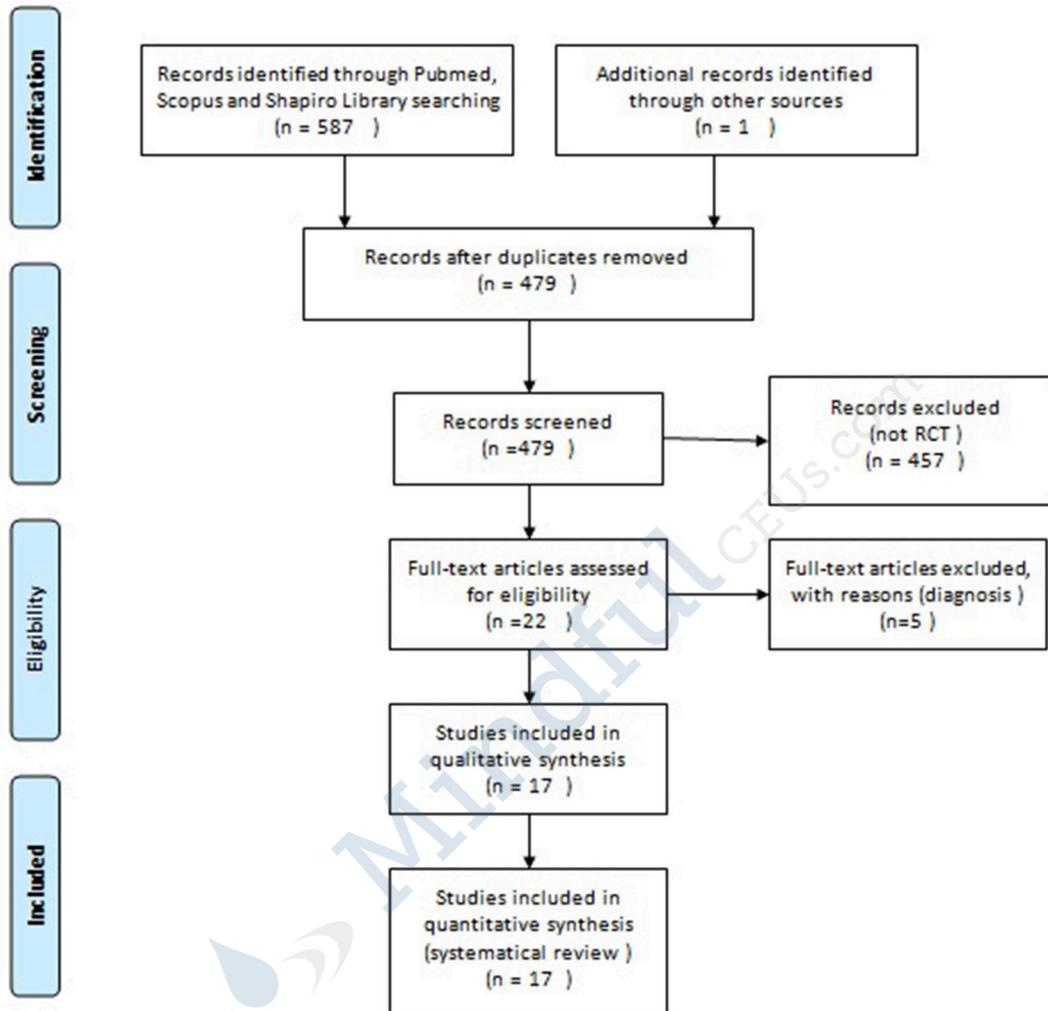
Since 2010, five datasets of RCT have been published in patients with a psychotic disorder and a comorbid PTSD or traumatic events (see Table 1) (Kim et al., 2010; de Bont et al., 2013, 2016; van den Berg et al., 2015; Van Minnen et al., 2016). These consist of two pilot studies (Kim et al., 2010; de Bont et al., 2013) and one large RCT (van den Berg et al., 2015) with two further subanalysis (de Bont et al., 2016; Van Minnen et al., 2016).

A Korean group (Kim et al., 2010) carried out the first RCT including 45 acute schizophrenic inpatients. Patients were randomized to 3 weekly sessions of EMDR therapy (lasting 60 to 90 min) ($n = 15$), 3 weekly sessions of progressive muscle relaxation therapy ($n = 15$) (the first session lasted 90 min and the other two sessions lasted 60 min), and treatment as usual (TAU, $n = 15$). In the EMDR condition, the therapeutic treatment targets included stressful life events related with the current admission, traumatic incidents from childhood or adulthood, treatment-related adverse events (e.g., involuntary admission or seclusion), and the experience of distressing psychotic symptoms. All patients received TAU, which consisted of naturalistic psychopharmacological treatment, individual supportive psychotherapy, and group activities whilst being admitted. All groups showed an improvement of the symptomatic domains, which included psychotic, anxious, and depressive symptoms, measured by the Positive and Negative Syndrome Scale (PANSS), the Hamilton Depression Rating Scale (HAM-D), and the Hamilton Anxiety Rating Scale (HAM-A). The variance analysis (ANOVA), revealed a significant improvement over time in each of the treatment groups; however, there was no significant differences between treatment groups for the total PANSS ($F = 0.73$, $p = 0.49$), HAM-D ($F = 0.41$, $p = 0.67$), or HAM-A ($F = 0.70$, $p = 0.51$). Still, the effect size for negative symptoms was larger for the EMDR condition (0.60 for EMDR, 0.39 for PMR and 0.21 for TAU only, no significant differences).

A Dutch group published a small pilot RCT in patients with psychosis and PTSD in 2013 (de Bont et al., 2013). Patients were randomized to prolonged exposure (PE) ($n = 5$) or EMDR therapy ($n = 5$) to treat PTSD symptoms with a maximum of 12 weekly sessions of 90 min. The PTSD diagnosis was verified using the Clinical-Administered PTSD Scale (CAPS) and the



PRISMA 2009 Flow Diagram



For more information, visit www.prisma-statement.org.

FIGURE 1 | PRISMA 2009 flow diagram. From Moher et al. (2009).

Post-traumatic Stress Symptom Scale Self-Report (PSS-SR). All patients were assessed with the Psychotic Symptoms Rating Scale interview (PSYRATS) and the Green Paranoid Thoughts Scale (GPTS) for psychotic symptoms. The mixed-model showed that in the intention to treat analysis, both groups reached a

significant decrease of PTSD symptoms during the treatment phase ($p < 0.001$, $r = 0.64$), this effect was maintained in the post-treatment phase ($p < 0.001$, $r = 0.73$) and in the 3 months follow up phase ($p < 0.001$). The same group conducted a large single-blind RCT including a sample of 155 outpatients with

TABLE 1 | RCT of EMDR in psychotic disorder.

Title author, year	Sample (n)	EM/Full protocol	Control condition	Main findings	Conclusions
Kim et al., 2010	45	EMDR	PR or TAU	EMDR=PR=TAU, but EMDR>PR>TAU in negative symptoms.	No differences within all groups, except of advantage of EMDR in negative symptoms.
de Bont et al., 2013	10	EMDR	PE or WL	PE=EMDR>WL in trauma symptoms.	PTSD patients with schizophrenia benefit from trauma-focused treatment approaches.
van den Berg et al., 2015	155	EMDR	PE or WL	EMDR = PE> WL in trauma symptoms.	Both trauma-focuses treatments are effective and safe to treat PTSD symptoms in patients with chronic psychotic disorders.
Van Minnen et al., 2016*	108	DS	NDS	DS=NDS in trauma symptoms.	Trauma-focused treatments for DS should not be excluded from these treatments.
de Bont et al., 2016*	155	EMDR	WL or PE	PE = EMDR>WL In paranoid thoughts. PE>EMDR>WL in depressive symptoms.	No differences within all groups, except of advantage of EMDR in paranoid thoughts and PE in depressive symptoms.

RCT, Randomized controlled trial; EMDR, Eye Movement desensitization and reprocessing; PR, progressive relaxation; TAU, treatment as usual; PE, Prolonged exposure; WL, wait-list control; PTSD, Post-Traumatic Stress Disorder; DS, Dissociative Subtype of PTSD; NDS, Non-Dissociative Subtype of PTSD.*These data sets corresponds to the clinical trial ISRCTN 79584912 of van den Berg et al. (2015).

a psychotic disorder (schizophrenia or schizoaffective disorder) and a comorbid PTSD (van den Berg et al., 2015). Patients were randomized to three different groups (PE, EMDR, and Waiting-List Condition). Forty-seven patients were in the waiting-list condition (WL), for the other two conditions, PE ($N = 53$) and EMDR therapy ($N = 55$), patients received 8 weekly sessions of 90 min each. PTSD symptoms were evaluated with the CAPS, PSS-SR, and the Post-traumatic Cognitions Inventory (PTCI). The authors found that EMDR and PE therapy were both superior to the WL condition in reducing PTSD symptoms (PE effect size 0.78, $t = -3.84$, $p = 0.001$; EMDR effect size 0.65, $t = -3.26$, $p = 0.001$). No significant differences were detected between PE and EMDR therapy.

Two further subanalysis of the main study were published (de Bont et al., 2016; Van Minnen et al., 2016). The first subanalysis (de Bont et al., 2016) provided evidence, that the severity of paranoid thoughts assessed by GPTS, decreased in a significant way (PE $t = -2.86$, $p = 0.005$; EMDR $t = -2.68$, $p = 0.008$) and rates of remission for psychotic disorders increased for both treatment conditions in comparison to the WL arm (de Bont et al., 2016). In another secondary analysis with a subsample of 108 patients (Van Minnen et al., 2016), the authors evaluated the effectiveness of both trauma-focused treatment for patients with psychosis with and without the dissociative subtype of PTSD. This diagnosis was established regarding the items 29 (derealization) and/or 30 (depersonalization) (frequency ≥ 1 and intensity ≥ 2) on the CAPS. They thought that, even though patients with a dissociative subtype of PTSD, showed significantly more severe PTSD symptoms at pre-treatment ($t = -0.29$, $p = 0.005$), the CAPS scores did no longer differ at post-treatment ($t = -1.34$, $p = 1.85$), when compared to patients without the dissociative subtype of PTSD.

In summary, one pilot study (Kim et al., 2010) found that EMDR therapy did not have a superior effect over progressive relaxation therapy or TAU in reducing trauma symptoms patients with PTSD and a psychotic disorder. In contrast, another

preliminary study provided a comparable effect of EMDR therapy to PE (de Bont et al., 2013). This was confirmed by a large and well-designed study (van den Berg et al., 2015) that suggested that patients with a psychotic disorder and PTSD improved both with EMDR therapy and PE therapy (comparable to WL) in trauma-associated and paranoid symptoms, despite the impact and the high prevalence of comorbid PTSD in psychotic disorders, evidence of the use of EMDR therapy in psychosis and trauma is still scarce.

EMDR Therapy in Affective Disorders

EMDR Therapy in Bipolar Disorder

So far, only 1 RCT has investigated the efficacy of EMDR therapy in bipolar disorder (Novo et al., 2014). Twenty bipolar patients with subsyndromal symptoms and a history of traumatic events were randomly assigned to 12 weeks of treatment with EMDR therapy or TAU. The participants were re-assessed at the end of this period and after a further 12 weeks of follow-up. Results showed significant reductions in affective scores in favor of the EMDR group after treatment. Affective symptoms were assessed through the HAM-D ($F = 23.86$, $p = 0.001$) and the Young Mania Rating Scale (YMRS) ($F = 14.41$, $p = 0.004$). However, changes from baseline to 24 weeks follow-up did not reach statistical significance. Regarding trauma symptoms, assessed by the CAPS and the Impact Event Scale (IES), results showed significant improvement in the EMDR group after treatment in both measures (CAPS $F = 6.26$, $p = 0.03$; IES $F = 20.36$, $p = 0.001$). At the follow-up assessment, only the IES scores remained statistically significant ($F = 20.32$, $p = 0.003$). Functional impairment was also assessed, but no group differences were found (Table 2).

EMDR Therapy in Unipolar Depression

Two controlled studies in EMDR therapy have been performed in unipolar depressive disorders (Behnamoghdam et al., 2015; Hase et al., 2015). A matched pairs study (Hase et al., 2015)

TABLE 2 | RCTs of EMDR in affective disorder, substance use disorders and chronic pain.

Author, year	Diagnosis	Sample (n)	EM/Full protocol	Control condition	Main findings	Conclusions
AFFECTIVE DISORDERS						
Novo et al., 2014	Bipolar disorder	20	EMDR	TAU	EMDR>TAU in trauma, depressive and hypomanic symptoms.	EMDR can help to treat subsyndromal mood beyond trauma symptoms in bipolar patients.
Hase et al., 2015	Unipolar depression	16	EMDR+TAU	TAU	EMDR+TAU>TAU	EMDR has positive effects in the treatment of depression.
Behnammoghadam et al., 2015	Depression after myocardial infarction	60	EMDR	WL	EMDR>WL	EMDR is an efficient treatment to depression in patients with myocardial infarction.
SUBSTANCE USE DISORDERS						
Hase et al., 2008	Alcohol Dependence	34	EMDR+TAU	TAU	EMDR+TAU>TAU	EMDR might be a useful approach for treating addiction memory and craving of alcohol.
Perez-Dandieu and Tapia, 2014	Alcohol and other substance use disorders	12	EMDR+TAU	TAU	EMDR+TAU>TAU	PTSD symptoms can be successfully treated with EMDR in substance abuse patients.
CHRONIC BACK PAIN						
Gerhardt, 2016		40	EMDR	TAU	EMDR>TAU	Pain-focused EMDR might be useful for non-specific chronic back pain patients.

RCT, Randomized controlled trial; EMDR, Eye Movement desensitization and reprocessing; TAU, Treatment as usual; WL, waiting list.

was conducted with 32 inpatients currently suffering from mild-to-moderate depressive episodes related to recurrent depression according to the ICD-10 criteria. One group was treated with EMDR therapy ($N = 16$) in addition to TAU and matched by time of admission, gender and age with 16 controls who only received TAU. Usually, only one EMDR session was provided. In the case of an incomplete session, a second EMDR therapy session was added. EMDR therapy focused on disturbing memories related to the onset and course of the depressive disorder; however, most of the traumatic memories did not meet PTSD criteria. The TAU arm consisted of individual psychodynamic psychotherapy, group therapy sessions and five group sessions of psychoeducation. All patients were assessed by the Beck Depression Inventory (BDI), the Depression subscale of the Symptom Checklist 90 revised (SCL-90-R), and the SCL-90-R Global Severity Index (GSI). The authors found that TAU plus EMDR therapy was more effective than TAU by itself in reducing depressive symptoms [significant pre-post differences in SCL-90-R GSI score ($p = 0.015$) and in SCL-90-R Depression subscale score ($p = 0.04$)].

Regarding the second study, the efficacy of EMDR therapy on depression of patients with post-myocardial infarction was tested (Behnammoghadam et al., 2015). Sixty patients were randomized to EMDR therapy, receiving three sessions of 45–90 min per week during 4 months, or to a control group without any psychotherapeutic intervention. All participants were assessed by the BDI at the beginning and end of the study. The EMDR group showed significant differences in the depressive scores of the BDI before and after the EMDR therapy (27.26 ± 6.41 and 11.76 ± 3.71 , $p < 0.001$). Mean scores of BDI also resulted significantly different between both groups at the end of the study (experimental group 11.76 ± 3.71 vs. control group 31.66 ± 6.09 , $p < 0.001$). The authors concluded that EMDR therapy was an effective, useful, efficient and non-invasive method to

treat depressive disorders in post-myocardial infarction patients (Table 2).

In summary, EMDR therapy has demonstrated preliminary positive evidence in one RCT as a promising therapy to treat depressive symptoms in unipolar depression (Hase et al., 2015). Furthermore, it might be a helpful tool to facilitate psychological and somatic improvement in patients with myocardial infarction who suffer subsequent depressive symptoms (Behnammoghadam et al., 2015).

EMDR Therapy in Anxiety Disorders

Six randomized studies have been carried out with EMDR therapy in anxiety disorders, beyond the diagnosis of PTSD (see Table 3) (Feske and Goldsteina, 1997; Goldstein et al., 2000; Nazari et al., 2011; Doering et al., 2013; Triscari et al., 2015; Staring et al., 2016).

The first study was carried out by Feske and Goldsteina (1997) in a sample of 43 patients with a diagnosis of panic disorder with agoraphobia. The diagnosis was established when symptoms were present for at least 1 year and at least one panic attack had occurred during the 2-week pre-test monitoring period. The subjects were randomized to EMDR therapy, eye fixation exposure and reprocessing therapy (EFER) (a version of EMDR omitting the ocular movements) or WL. The main aims of this study were to assess the efficacy of EMDR therapy in panic disorder and to analyze whether or not this correlates with the eye movements. Patients in both experimental groups, received five sessions over an average period of 3 weeks (one session of 120 min and four of 90 min). Authors found a significant improvement in post-treatment measures when comparing the EMDR group with the WL group ($p < 0.05$). ANCOVAS test revealed that the EMDR group was superior to the EFER group on 2 out of 5 primary measures of anxiety, specifically in the Agoraphobia-Anticipated Panic-Coping Composite ($F = 7.65$, $p = 0.009$) and

TABLE 3 | RCTs of EMDR in anxiety disorders.

Author, year	Diagnosis	Sample (n)	EM/Full protocol	Control condition	Main findings	Conclusions
Feske and Goldsteina, 1997	Panic disorder with agoraphobia	43	EMDR	WL or EFER	EMDR>WL in panic-related symptoms. EMDR=EFER	This study provides initial support for EMDR in the treatment for panic disorder.
Goldstein et al., 2000	Panic disorder with agoraphobia	45	EMDR	TAU and WL	EMDR=TAU>WL for anxiety, severity and agoraphobia. EMDR=WL<TAU for panic attack frequency and anxious cognitions.	EMDR partly effective but did not reduce panic attack frequency.
Doering et al., 2013	Dental phobia	31	EMDR	WL	EMDR>WL in dental anxiety and avoidance behavior.	EMDR effective in processing memories of past dental events in patients with dental phobia.
Triscari et al., 2015	Flying anxiety	65	EMDR+CBT	CBT-SD or CBT-VRET	EMDR+CBT=CBT-VRET=CBT-SD	Trauma focuses approaches are effective to treat patients with flying anxiety.
Staring et al., 2016	Anxiety disorders	47	EMDR	COMET	COMET>EMDR in self-esteem in anxiety disorders.	EMDR did not improve self-esteem in patients with anxiety disorders.
Nazari et al., 2011	OCD	90	EMDR	CTP	EMDR>CTP	EMDR can be more useful in short term than medication in improvement of OCD symptoms.

RCT, Randomized controlled trial; EMDR, Eye Movement desensitization and reprocessing; WL, wait-list control; EFER, Eye fixation exposure and reprocessing; TAU, treatment as usual; CPT, Citalopram; BDORT, Bi-Digital-O-Ring-Test; CBT, Cognitive Behavioral therapy; CBT-SD, Cognitive Behavioral Therapy integrated with systematic desensitization; VRET, Cognitive Behavioral Therapy +virtual reality exposure therapy; COMET, Competitive Memory Training.

General Anxiety-Fear of Panic Composite ($F = 5.28, p = 0.028$), on secondary measures of depression (BDI $F = 4.96, p = 0.033$), and on social adjustment, measured by the Social Adjustment Scale, Self-Report ($F = 5.96, p = 0.020$). However, at 3 months follow up, results did not remain significant.

Goldstein et al. aimed to replicate these results in 46 outpatients with a panic disorder and agoraphobia. Patients were randomized to EMDR therapy (6 sessions lasting 90 min conducted along 4 weeks), a credible attention-placebo control group or to a WL condition (Goldstein et al., 2000). The attention-placebo condition, consisted in a combination of 30–45 min of progressive muscle relaxation training and 45–60 min of association therapy. Compared to the WL condition, patients in the EMDR group showed a significant improvement on the measures of severity of anxiety, panic disorder and agoraphobia ($F = 9.91, p \leq 0.01$), but the authors did not find significant changes in panic attacks frequency ($F = 1.3, p \geq 0.05$) nor in anxious cognitions ($F = 2.69, p \geq 0.05$). They found that EMDR therapy was superior to WL with a medium to large effect for all anxiety measures. ANOVAs test did not show any significant differences between EMDR therapy and the credible attention-placebo control condition (all measures: cognitive measures, panic and agoraphobic severity, diary and panic frequency were $p > 0.13$). Although EMDR therapy was superior to the WL condition, they concluded, based on their results, that EMDR therapy should not be the first-line treatment for panic disorder with agoraphobia.

One RCT so far has compared EMDR therapy with other psychotherapies to treat flight anxiety (Triscari et al., 2015). Of 65 patients, 22 patients were randomized to cognitive behavioral therapy integrated with systematic desensitization (CBT-SD), 22 patients to CBT with EMDR therapy (CBT-EMDR) and 21

patients to CBT combined with virtual reality exposure (CBT-VRET). All patients were assessed with the Flight Anxiety Situations Questionnaire and with the Flight Anxiety Modality Questionnaire. They received 10 weekly sessions of 2 h duration. No mean differences were found between the three groups after treatment or at follow-up, but all interventions showed efficiency in reducing fear of flying, demonstrating a high effect size (Cohen's d ranged from 1.32 to 2.23).

Another RCT has been performed in dental phobia (Doering et al., 2013). Sixteen patients were randomized to 3 weekly sessions of EMDR therapy, 90 min each, and 15 patients to a non-interventional WL. All patients were assessed with the Dental Anxiety Scale (DAS) and the Dental Fear Survey (DFS), secondary measures were assessed with the Brief Symptom Inventory and the Clinical Global Impression Score. Anxiety and depressive symptoms were assessed with the German Version of Hospital Anxiety and Depression Scale, symptoms of PTSD with the Impact of Event Scale-Revised and dissociative symptoms with the German Version of Dissociative Experiences Scale. The EMDR group demonstrated a significant decrease of dental anxiety scales with an effect size of 2.52 and 1.87 in DAS and DFS, respectively ($p < 0.001$). The effect sizes after 3 months (DAS 3.28 and DFS 2.28) and after 12 months (DAS 3.75 and DFS 1.79) persisted among the follow-up ($p < 0.001$). The most important result of this study was that a high number of patients overcame their avoidance behavior and visited the dentist regularly following treatment.

Furthermore, a recent trial compared EMDR therapy and competitive memory training (COMET) in the treatment of anxiety disorders with the purpose to improve self-esteem (Staring et al., 2016). The authors included 47 patients with a primary anxiety disorder and low self-esteem, which were

assessed by the Rosenberg Self-esteem Scale, the Self-esteem Rating Scale-short Form and the STAI. Depressive symptoms were evaluated with BDI-II. Patients were randomized in a crossover design. Twenty-four patients received 6 EMDR therapy sessions and then 6 COMET sessions, the other 23 patients received firstly 6 COMET sessions and then 6 EMDR therapy sessions. COMET was more effective in improving self-esteem than EMDR therapy (effect sizes of 1.25 vs. 0.46, respectively). When EMDR therapy was applied before COMET, the effects of COMET on self-esteem and depression were significantly reduced. It could be hypothesized that EMDR therapy could diminish the effectiveness of the COMET intervention.

Finally, 1 RCT was performed in obsessive-compulsive disorder (OCD) (Nazari et al., 2011). They recruited a sample of 90 patients who were randomized to a treatment condition with Citalopram (a selective serotonin reuptake inhibitor) or EMDR therapy during 12 weeks. All subjects were assessed with the Yale-Brown Obsessive-Compulsive Scale before and after the treatment. They observed that both treatments were effective to treat obsessive symptoms, but the EMDR therapy group showed a faster improvement of obsessive and compulsive symptoms than the group treated with Citalopram ($p = 0.001$).

In summary, EMDR therapy has demonstrated in 4 RCT a positive effect on anxious and OCD symptoms (Feske and Goldsteina, 1997; Nazari et al., 2011; Doering et al., 2013; Triscari et al., 2015), whereas 1 RCT in panic disorder with agoraphobia was in part negative (Goldstein et al., 2000) and another study failed in improving self-esteem in patients with anxiety disorders (Staring et al., 2016).

EMDR Therapy in Substance Use Disorders

Two studies so far have explored the efficacy of EMDR therapy in substance use disorders (Hase et al., 2008; Perez-Dandieu and Tapia, 2014). In a first study, 34 alcohol addicted patients were randomly assigned to TAU or TAU plus two sessions of EMDR therapy (Hase et al., 2008). The overall aim was to assess the craving intensity for alcohol via the Obsessive Compulsive Drinking Scale (OCDS) at pretreatment, post-treatment, and follow-up at 1 and 6 months. Likewise, other variables such as depression or anxiety symptoms were analyzed. Compared to pretreatment, post-treatment scores of craving and depression revealed a significant improvement in the experimental group (OCDS $t = 10.7$, $p < 0.001$; BDI $t = 4.0$, $p = 0.001$), while only a small reduction in both measures was noticed in the control group (OCDS $t = 1.1$, $p = 0.29$, BDI $t = 0.9$, $p = 0.37$). Between both groups, the difference in OCDS scores post-treatment was statistically significant ($p < 0.001$). These differences were maintained at 1-month follow-up ($p < 0.05$) but not at 6 months.

In a second study, 12 alcohol and/or drug addicted women with PTSD were randomized to TAU or TAU plus eight sessions of EMDR therapy (Perez-Dandieu and Tapia, 2014). Outcome criteria were PTSD symptoms, addiction symptoms, depression, anxiety, self-esteem [measured with Coopersmith's Self-esteem Inventory (SEI)] and alexithymia [assessed by Toronto Alexithymia Scale (TAS)]. Compared to pretreatment, PTSD scores showed a significant improvement in the experimental group compared to the control group

(TAU+EMDR $t = 4.22$, $p = 0.008$; TAU $t = -0.94$, $p = 0.38$). Between both groups, the difference in the post-treatment PTSD scores, was also statistically significant ($p < 0.01$). Regarding addiction symptoms, no differences between both groups were detected. Finally, regarding the measures of depression, anxiety, self-esteem, and alexithymia, the experimental group showed a significant improvement in all of them except in the TAS (BDI $t = 4.38$, $p = 0.007$; STAI $t = 2.65$, $p = 0.04$; SEI $t = -3.37$, $p = 0.01$). On the contrary, the control group showed no significant differences in any measure. Between both groups, only the difference in post-treatment BDI scores were statistically significant ($t = 14.13$, $p < 0.004$).

Considering the results of both studies, EMDR therapy could be a useful therapy to use in substance use disorders with a history of traumatic life events in order to improve the prognosis of these patients (Perez-Dandieu and Tapia, 2014). Besides, EMDR therapy could help as an adjuvant psychotherapy to standard treatment of alcohol dependence directly decreasing craving (Hase et al., 2008; **Table 2**).

EMDR Therapy and Chronic Pain

One RCT has investigated so far the efficacy of EMDR therapy in the treatment of patients suffering from chronic pain (see **Table 2**; Gerhardt, 2016). Forty patients with chronic back pain and psychological trauma were randomized to 10 sessions of EMDR therapy in addition to TAU or TAU alone. The participants were re-assessed 2 weeks after study completion and also at 6 months follow-up after the end of the treatment. The primary outcome was its efficacy in pain reduction, measured by pain intensity, disability and treatment satisfaction. Estimated effect sizes between groups for pain intensity and disability were $d = 0.79$ (CI_{95%}: 0.13, 1.42) and $d = 0.39$ (CI_{95%}: -0.24, 1.01) at post-treatment and $d = 0.50$ (CI_{95%}: 0.14, 1.12) and $d = 0.14$ (CI_{95%}: -0.48, 0.76) at 6 months follow-up. Evaluation on treatment satisfaction from the patient's perspective showed that about 40% of the patients in the EMDR group in addition to TAU improved clinically and also rated their situation as clinically satisfactory, whilst in the control group, no patients showed clinical improvement. In view of these results, the authors concluded that EMDR therapy is a safe and effective therapeutic strategy to reduce pain intensity and disability in patients with chronic back pain.

DISCUSSION

This systematic review aimed to describe briefly the current evidence regarding EMDR therapy in patients with psychiatric conditions beyond PTSD but with a history of comorbid traumatic events. Even though RCT of EMDR therapy in severe mental disorders beyond PTSD are still scarce, an increased trend of publications at last decade has been observed. In general terms, we can conclude that there is currently insufficient evidence to recommend EMDR therapy as a treatment of choice in psychotic disorders and, so far, the same occurs with bipolar disorders (Kim et al., 2010; de Bont et al., 2013; Novo et al., 2014; van den Berg et al., 2015; Van Minnen et al., 2016). However, a large

trial is being currently conducted in order to reach more accurate conclusions (Moreno-Alcazar et al., 2017).

The largest RCT of EMDR therapy in other psychiatric disorders has been performed in patients suffering from a psychotic disorder and a comorbid PTSD (van den Berg et al., 2015). Trauma-associated symptoms but also paranoid thoughts improved equally in both active comparators, EMDR and PE, when compared to WL. Both interventions were considered as safe. Both treatments were also effective in reducing PTSD symptoms with no significant differences between them in terms of effect or safety. The lack of superiority of EMDR therapy over the other treatment condition might be due to the fact that this study only applied 3 EMDR therapy sessions, which might be insufficient and infratherapeutic considering the symptomatic complexity of the sample, suffering from both schizophrenia and PTSD. In the subanalysis of the study, the authors pointed out that patients with a dissociative subtype of PTSD had a similar and favorable response to trauma focused treatments than those without the dissociative subtype, so this subgroup could benefit from this treatment and should not be excluded. These results are clinically relevant considering that patients with a psychotic disorder frequently suffer from comorbid adverse events/PTSD which affects in a negative way the course of the illness. Unfortunately, this is rarely taken into account when clinicians develop a personalized therapeutic plan, as therapists often believe treating traumatic events might deteriorate the patient's psychopathological state.

Similar to psychotic disorders, bipolar patients experience comorbid PTSD with a prevalence of 20% approximately (Hernandez et al., 2013; Passos et al., 2016; Cerimele et al., 2017). PTSD symptoms as well as life events cause more affective episodes (Simhandl et al., 2015). Therefore, trauma-orientated interventions need to be integrated in treatment strategies for bipolar patients. Positive evidence of trauma-orientated therapies, such as CBT and cognitive restructuring, exist in both psychotic and bipolar disorders with comorbid PTSD, these interventions have proven to be effective and safe (Mueser et al., 2008, 2015). Additionally, EMDR therapy has also been tested to treat traumatic symptoms in this population. Hereby in a pilot RCT including patients with a bipolar disorder (types I and II) with subsyndromal symptoms and a history of traumatic events, the authors found that patients showed an improvement in comparison to the TAU condition (Novo et al., 2014) and did not develop any mood episode related to the EMDR therapy. Given these results, EMDR therapy could be a promising and safe therapeutic strategy to reduce trauma symptoms and stabilize mood in traumatized bipolar patients, which is why a specific EMDR bipolar protocol has been suggested (Batalla et al., 2015). Currently, this EMDR protocol is being tested vs. supportive therapy in a large multicenter RCT including bipolar patients with a history of traumatic events (Moreno-Alcazar et al., 2017).

In depressive disorders, one study demonstrated the effectiveness of EMDR therapy compared to psychodynamic psychotherapy, group therapy, and psychoeducation therapy (Hase et al., 2008). EMDR therapy improved memories of stressful life events at onset of depressive episodes, emotional

cognitive processing and long-term memory conceptual organization (Hase et al., 2008).

Within anxiety disorders, conflicting results were found in panic disorders with agoraphobia as it seems that EMDR therapy decreases severity of anxiety, panic disorder, and agoraphobia but not panic attacks frequency and anxious cognitions. Authors recommended EMDR therapy as an effective alternative to treat panic disorder with agoraphobia when other evidence-based treatments, such as exposure therapy or cognitive-behavior therapy, had failed. Nevertheless, panic disorder studies were not able to demonstrate an effect of EMDR therapy on anxious cognitions, as you would expect to find after applying the therapy. In OCD or phobias studies we did not find this fact. Further larger trials are needed to answer whether or not EMDR therapy is a valid therapeutic option as first line treatment in anxiety disorders and OCD.

Evidence of RCT so far suggests that EMDR therapy is a useful tool in the treatment of specific phobias, like flight anxiety or dental phobia, whether or not related to PTSD symptoms (Doering et al., 2013; Triscari et al., 2015).

In substance use disorders, EMDR therapy has been tested mainly in alcohol use disorders (Hase et al., 2008). EMDR therapy appears hereby to be useful as it decreases craving and drinking behavior (Hase et al., 2008; Perez-Dandieu and Tapia, 2014).

Finally, EMDR therapy was also effective in a first RCT for the treatment of chronic back pain (Gerhardt, 2016). This is not surprising as the impact of stress on both mental and physical health has been acknowledged for many years (Schneiderman et al., 2005). Pain as consequence of a traumatic event has been hereby identified as a risk factor for the development of PTSD (Norman et al., 2008) and often PTSD and chronic pain are concomitant (Beckham et al., 1997; Beck and Clapp, 2011; Moeller-Bertram et al., 2012). Again, further trials are needed to confirm the efficacy of EMDR therapy in this complex and often difficult to treat population.

The main limitation of this review is that RCT are scarce so far; however, as the use of EMDR therapy is increasing and gaining popularity, this systematic review is timely. Another limitation is that some of the included studies had very few therapeutic sessions. The high heterogeneity in number and duration of EMDR therapy sessions could have a negative effect on the results, so these must be taken cautiously (Hase et al., 2008, 2015; Kim et al., 2010; Behnammoghadam et al., 2015).

In general, EMDR therapy seems a safe intervention (Feske and Goldsteina, 1997; Hase et al., 2008, 2015; Doering et al., 2013; Novo et al., 2014; Perez-Dandieu and Tapia, 2014; Triscari et al., 2015; van den Berg et al., 2015; Gerhardt, 2016). This is of importance as it allows clinicians to consider EMDR therapy as an appropriate treatment in various psychiatric comorbid conditions without causing side effects.

AUTHOR CONTRIBUTIONS

AV has performed the bibliographic search and has elaborated the first draft of the manuscript. AM has participated in the selection of included studies, resolved methodological doubts

of possible studies, and helped in the first version of this manuscript. DT helped in the development of this review and revised the manuscript as native speaker. CC has collaborated in methodological aspects of this article. VP and FC have contributed in the improvement of the manuscript and BA had the idea of this work and revised the last version of this article.

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