DOI: 10.14744/DAJPNS.2024.00236
Dusunen Adam J Psychiatr Neurol Sci
2024;37:44-53

REVIEW ARTICLE

Metacognitive therapy in post-traumatic stress disorder: A meta- analysis

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ABSTRACT

The metacognitive model of post-traumatic stress disorder (PTSD) proposes that the natural emotional processing following a traumatic event may be impaired due to the negative effects (thoughts and emotions) related to the trauma and its memory. Metacognitive Therapy (MCT) is increasingly being used as a treatment for PTSD. This meta-analysis aimed to examine the effectiveness of MCT clinical outcomes in treating PTSD over the past two decades. In this meta-analysis, we analyzed experimental studies published between January 2000 and October 2022, in which MCT was administered to young and adult patients with PTSD. We searched databases including ERIC, ETHOS, Google Scholar, Medline, ProQuest, PsycNet, PubMed, and Web of Science. Overall, seven studies examining PTSD met our eligibility criteria; all seven utilized pre- and post-treatment measurements. We identified only one study conducted with children and adolescents (ages 10–19). Within the scope of the meta-analysis, effect size and heterogeneity were analyzed, and publication bias was assessed. We found that the comparison of pre- and post-treatment resulted in a large effect size (Hedges' g=2.878), indicating that MCT is an effective treatment for PTSD. The significance of the Q statistic suggests heterogeneity. Our analysis indicates an absence of publication bias. The current study's pre- and post-treatment effect size estimates suggest that MCT is effective in reducing PTSD symptoms, indicating that MCT can be a superior treatment for PTSD. However, further randomized controlled trials and cross-cultural studies with larger participant pools are necessary to reach more definitive conclusions.

Keywords: Metacognitive model, post-traumatic stress disorder, pre- and post-treatment, meta-analysis

INTRODUCTION

Post-traumatic stress disorder (PTSD) is classified as a disorder related to general adjustment and anxiety, occurring as a result of the immediate or prolonged impact of a traumatic event (1). The diagnosis criteria for PTSD include specific symptoms such as re-experiencing the traumatic event, avoiding reminders of the trauma, hypervigilance, and negative thoughts and emotions (1). PTSD is a common mental health issue globally (2), with a lifelong prevalence ranging from 0% to 6% across different countries (3, 4).

Various psychological treatments have been employed to address the symptoms of PTSD (5). Cognitive Behavioral Therapy (CBT) (6, 7), exposure therapy (8), Eye Movement Desensitization and Reprocessing (EMDR) (9), and mindfulness practices (10) have all been shown to be effective in treating PTSD through randomized controlled trials and comparative studies. The efficacy of these models and techniques has also been evaluated through meta-analytic methods (6–10).

The treatment objectives of the aforementioned models and techniques in relation to the diagnostic

How to cite this article: Buyukoksuz E, Giray G. Metacognitive therapy in post-traumatic stress disorder: A meta- analysis. Dusunen Adam J Psychiatr Neurol Sci 2024;37:44-53.

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Received: July 11, 2023; **Revised:** December 18, 2023; **Accepted:** December 30, 2023

criteria for PTSD are summarized as follows: CBT aims to develop skills to manage cognitive distortions and anxiety related to avoidance behaviors (11, 12). Exposure therapy focuses on confronting the triggers and memories associated with the traumatic event (13). EMDR utilizes mental imagery and addresses negative cognitions linked to the traumatic event for reprocessing purposes (14, 15). Mindfulness encourages the development of coping and acceptance skills for trauma-related situations through practices based on breathing, relaxation, and meditation (16).

While CBT, particularly through prolonged exposure and cognitive processing techniques, has been proven to be effective by numerous experimental studies (17), evidence also suggests that the application of CBT through exposure and reprocessing techniques may have adverse effects on some individuals with PTSD (18). In an effort to mitigate these negative outcomes by targeting cognitive processes such as attention, processing, memory, and emotion regulation, cross-sectional studies have identified a significant correlation between metacognitive beliefs and PTSD symptoms (19). Also, the results of experimental studies have indicated that Metacognitive Therapy (MCT) (20) is effective in treating PTSD (21, 22). According to MCT, psychopathology stems from a Cognitive Attention Syndrome (CAS) and a self-regulatory executive function model (23). CAS consists of ineffective coping strategies that individuals use to manage distressing thoughts and feelings (24). While the natural process, known as reflexive adaptation in the face of difficult situations, allows individuals to heal, metacognitions lead to persistent and repetitive thinking about the trauma or threat (25). CAS lays the groundwork for the development of PTSD due to perseveration, perseverative thinking styles, self-focused attentional biases, threat scanning strategies, and ineffective self-regulatory behaviors developed by the patient.

The metacognitive model of PTSD, developed by Wells and Sembi, proposes that natural emotional processing following a traumatic event can be interrupted by maladaptive beliefs about thinking (metacognitive beliefs) and maladaptive beliefs about traumatic memory (meta-memory beliefs) (25). According to Wells, most individuals possess the capacity for self-repair following trauma and do not develop long-term psychological problems (26). However, the conceptual processing caused by CAS can exacerbate PTSD symptoms following stress. CAS can manifest as perseverative thinking styles, such as worry or rumination, attention focused on threats, and ineffective coping strategies (such as suppression, avoidance, and substance use) that can perpetuate symptoms (26).

Since the initial studies by Wells and Sembi, numerous studies in the literature have successfully applied MCT and techniques such as attention training techniques, detached mindfulness, and free association tasks in the treatment of PTSD (25). There is a systematic review of the effectiveness of MCT on PTSD (27). However, research on its general effect and effect size is lacking. In conclusion, the effectiveness of MCT and techniques used independently (attention training technique, detached mindfulness, and free association task as a form of detached mindfulness) on PTSD have been analyzed using meta-analysis, synthesizing the available results.

This study aims to investigate the effectiveness of MCT as a treatment for PTSD, utilizing the meta-analysis method. To achieve this goal, specific criteria were established to select relevant literature, and a comprehensive literature review was conducted. The selected studies that met the predetermined criteria were analyzed using the meta-analysis method to determine the effectiveness of MCT in treating PTSD.

METHOD

The current meta-analysis examines the effectiveness of experimental design treatments for PTSD symptoms. Meta-analysis provides important statistical evidence based on effect size, heterogeneity, and publication bias, which is especially critical for validating empirical research (28).

Procedures

We initiated a comprehensive research strategy to identify both published and unpublished literature on the effectiveness of metacognitive therapy and its techniques on PTSD. Initially, we scanned ERIC, ETHOS, Google Scholar, Medline, ProQuest, PsycNet, PubMed, and Web of Science for studies published between January 2000 and October 2022. The search term syntax used in the databases was as follows: “posttraumatic stress” OR “post-traumatic stress” OR PTSD AND “metacognitive therapy” OR “detached mindfulness” OR “free association task” OR “attention training technique”. A total of 10 articles met the eligibility criteria and were subjected to a full-text review by the authors for inclusion in the final meta-analysis. After reviewing the complete texts of these papers, we ultimately included seven articles in the meta-analysis.

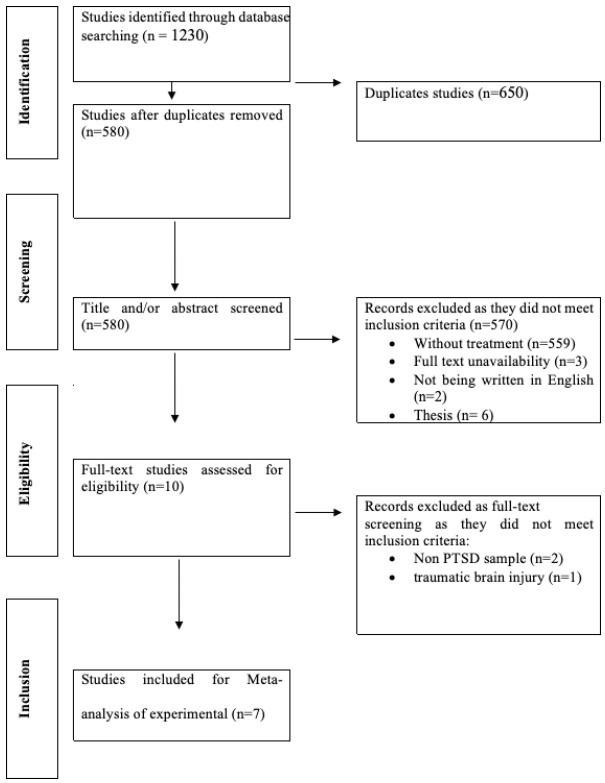

Figure 1. Flowchart for the inclusion criteria process.

Inclusion and Exclusion Criteria

We identified articles based on the use of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (29) diagnostic criteria for PTSD, structured clinical interviews, and self-report measures to assess PTSD. The criteria considered for inclusion in our study are as follows:

(a) Studies should include individuals diagnosed with PTSD who have been exposed to traumatic experiences.
(b) They must be empirical studies focused on PTSD.
(c) The interventions should involve metacognitive therapy or techniques derived from metacognitive therapy.
(d) They should utilize the PTSD scale.
(e) They must be written in English.
(f) The included literature must comprise articles from peer-reviewed journals.
(g) They should have been published between January 2000 and October 2022 (Fig. 1).

The analysis is based on seven studies that evaluated MCT administered to participants with PTSD (22, 25, 30–34). In each study, patients had been exposed to traumatic situations at least a month before the commencement of the research. The studies either included individuals not on medication or ensured that those on medication did not discontinue its use during the study. Individuals with suicidal tendencies were excluded from the research. The studies employed different experimental designs, with most following a single-group pre- and post-test design. Some studies included a control group, and some had follow-up assessments. The number of participants and raw values in the single-group pre- and post-test design are detailed in Table 1. Participants who dropped out of the studies were not included in the meta-analysis.

Study Quality

The National Heart, Lung, and Blood Institute (NHLBI) (35) recommends presenting quality assessment criteria to examine the internal validity of the studies. The quality of the studies was evaluated using versions of the Quality Assessment Tool for Before-After (Pre-Post) Studies with No Control Group, the Quality Assessment of Controlled Intervention Studies, and the Quality Assessment Tool for Case Series Studies (35) listed in Table 2.

Statistical Analysis Plan

The quality of the studies included in the analysis and access to all studies that meet the criteria are crucial in meta-analysis. Analyses were performed using the Comprehensive Meta-Analysis (CMA) software package and prediction intervals program. The meta-analysis examined effect size and heterogeneity, and publication bias was assessed.

Meta-analysis can be conducted using different statistical models, including the fixed effect model, random effect model, and mixed effect model. The fixed-effect model is a statistical approach that assumes that there is a single true effect size underlying all the studies analyzed. This model is suitable if the researcher aims to generalize the meta-analysis results to a study population with similar characteristics (36). According to this model, any differences in observed effects across studies are attributed solely to random error in the sampling process. This assumption implies that the true effect size is consistent across all studies and that any observed variation is due to chance.

Different indexes can be utilized to calculate the effect size, including Cohen's *d*, Glass's Δ, or Hedges' *g*, which investigate standardized differences between means (37). Cohen's *d* index represents the difference between the means of the groups being compared, given in standard score units or *z-scores* (38). Both Cohen's *d* and Hedges' *g* aim to estimate the standardized mean difference, but Cohen's *d* is known to have a bias that tends to exaggerate the absolute value of the standardized mean difference. The estimator known

Table 1: Studies' effect sizes

Authors	Cou.	*n*	Age range/ *M(SD)*	Gen.	PTSD complaints	PTSD assessment	Treatment	Time post-assault	Pre *M*	Pre *SD*	Post *M*	Post *SD*	Quality rating[b]
Wells & Sembi, 2004 (25)	UK	6	19–50	F: 5 M: 1	Armed robbery, sexual assault	1) PTSDC 2) BDI 3) BAI 4) Penn inventory for PTSD 5) IESa 6) DTS	Metacognitive therapy	Pre- and post-treatment, and at 3, 6, and 18-41 months	The t-value was used due to the absence of pre- and post-treatment values. t=10.5, p<0.0005				58.33
Wells et al., 2008 (33)	UK	11	19–58	F: 6 M: 5	Traffic accident, violent physical assault, armed robbery, threatened and held at gunpoint, witness	1) IESa 2) Penn inventory for PTSD 3) BDI 4) BAI	Metacognitive therapy	Pre- and post-treatment, and at 3- and 6-month intervals	49.9	12.90	12.60	11.7	75
Wells & Colbear, 2012 (22)	UK	10	33.4 (13.4)	F: 6 M: 4	Assault, robbery, traffic accident, sexual assault, witness	1) PTSDC 2) IESa 3) BDI 4) BAI 5) Assessor Rating. 6) TCQ	Metacognitive therapy	Pre- and post-treatment, and at 3- and 6-month intervals	53.2	12.10	20.50	18.1	75
Zafarizadeh et al., 2014 (34)	Iran	15	Non-defined	F: 0 M: 15	Traffic accident	MPTSDSa	Metacognitive therapy	Pre- and post-treatments, as well as at a follow-up 2-month interval	147.07	9.66	84.80	13.74	75
Callinan, Johnson & Wells, 2015 (30)	UK	29	Non-defined	Non-defined	The stressful life events were clustered into four categories: death of a close one, sexual/ physical assault, traffic accident, unexpected illness	1) IESa 2) DMQ 3) PANAS 4) SARS	Attention training	Pre- and post-treatments	13.80	4.02	16.14	3.71	66.67
Wells et al., 2015 (32)	UK	10	40.6 (11.9)	F: 4 M: 6	Assault, witness, fire, war/ combat, armed robbery	1) IESa 2) PTSDC 3) BDI 4) BAI 5) HR	Metacognitive Therapy	Pre- and post-treatment and at a follow-up 3-month interval	53.30	8.87	9.90	9.69	75
Simons & Kursawe, 2019 (31)	Ger	18	10–19	F: 14 M: 4	House fire, sexual abuse, suicide of brother, suicide attempt by boyfriend, rape, domestic violence, peer violence, death of a family member, traffic accident	1) CRIES-13a 2) CPSS	Metacognitive therapy	Pre- and post-treatments, as well as at a follow-up 3- to 5-month interval	47.33	9.62	9.06	12.55	75

Cou: Country; Gen: Gender; UK: United Kingdom; Ger: Germany; F: Female; M: Male; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory; CPSS: Child PTSD Symptom Scale; CRIES-13: Revised Child Impact of Events Scale; DMQ; The Detached Mindfulness Questionnaire; DTS: Davidson Trauma Scale; IES: Impact of Events Scale; MCT: Metacognitive theory; MPTSDS: Mississippi Post-Traumatic Stress Disorder Scale; PANAS; Positive and Negative Affect Schedule; PTSDC: Posttraumatic Stress Diagnostic Scale; SARS: Self-Attention Rating Scale; HR: Heart rate; TCQ: Thought Control Questionnaire; a: It is the measurement tool used for meta-analysis; b: Range: 0–100; higher scores indicate higher methodological quality and lower risk of bias.

Table 2: Quality assessment tool for before-after (pre-post) studies with no control group (NHLBI, 2003)

Quality assessment tool for before-after (pre-post) studies with no control group (NHLBI, 2003)	Wells & Sembi 2004 (25)	Wells et al. 2008 (33)	Wells & Colbear 2012 (22)	Zafarizadeh et al. 2014 (34)	Callinan, Johnson & Wells 2015 (30)	Wells et al. 2015 (32)	Simons & Kursawe, 2019 (31)
1. Was the study question or objective clearly stated?	1	1	1	1	1	1	1
2. Were eligibility/selection criteria for the study population prespecified and clearly described?	1	1	1	1	1	1	1
3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	1	1	1	1	1	1	1
4. Were all eligible participants who met the prespecified entry criteria enrolled?	1	1	1	1	1	1	1
5. Was the sample size sufficiently large to provide confidence in the findings?	0	1	1	1	1	1	1
6. Was the test/service/intervention clearly described and delivered consistently across the study population?	0	0	0	0	0	0	0
7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	0	1	1	1	1	1	1
8. Were the individuals assessing the outcomes blinded to the participants' exposures/ interventions?	1	1	1	1	1	1	1
9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	1	1	1	1	0	1	1
10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests conducted that provided p-values for the pre-to-post changes?	1	1	1	1	1	1	1
11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., was an interrupted time-series design used)?	0	0	0	0	0	0	0
12. If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.), did the statistical analysis take into account the use of individual-level data to determine effects at the group level?	0	0	0	0	0	0	0
Total	7	9	9	9	8	9	9
Quality rating	58.33	75	75	75	66.67	75	75

as Hedges' *g* addresses most of the bias inherent in Cohen's *d*, and unless the sample size is smaller than 10, the difference between *d* and *g* is generally negligible (39). Since one study had fewer than 10 participants and used standardized mean difference, Hedges' *g* was employed. The forest plot serves as a graphical representation of the results in a meta-analysis.

Heterogeneity in meta-analysis refers to variation in the true effect size across different studies. Some researchers argue that heterogeneity can diminish the usefulness of a meta-analysis, with some even suggesting that meta-analysis should not be conducted at all when effect sizes are heterogeneous. However, the reality is more nuanced, and there are methods to manage heterogeneity in meta-analysis to still yield valuable insights (40). The presence of heterogeneity indicated the extent to which conclusions can be generalized (41). In other words, heterogeneity explores the true effect range of the independent variable. The power of I^2 and *Q* were

Authors	Statistics for each study							Hedges's *g* and 95% CI
	Hedges's *g*	*SE*	Variance	Lower limit	Upper limit	*Z-Value*	*p-Value*	
Wells & Sembi, 2004 (25)	3.610	1.097	1.204	1.459	5.760	3.290	0.001	
Wells et al., 2008 (33)	2.792	0.720	0.518	1.381	4.202	3.879	0.000	
Wells & Colbear, 2012 (22)	1.895	0.562	0.316	0.793	2.996	3.372	0.001	
Zafarizadeh et al, 2014 (34)	4.862	1.009	1.017	2.886	6.839	4.821	0.000	
Callinan, Johnson & Wells, 2015 (30)	0.588	0.215	0.046	0.166	1.010	2.732	0.006	
Wells et al., 2015 (32)	4.266	1.092	1.192	2.126	6.406	3.907	0.000	
Simons & Kursawe, 2019 (31)	3.233	0.640	0.409	1.979	4.486	5.054	0.000	
	2.878	0.684.	0.468	1.538	4.219	4.209	0.000	

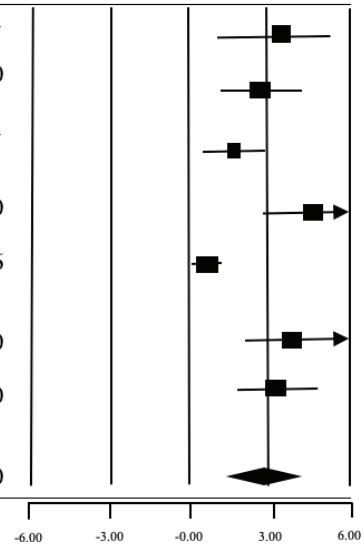

Figure 2. Forest plot.

found to be quite similar (42). In meta-analysis, a significant *Q* indicator or $I^2 \geq 75\%$ is one method to assess study heterogeneity, suggesting that choosing the random effect model is prudent due to the detected heterogeneity in the studies (43).

Publication bias is the phenomenon where the research published in scientific literature does not represent the overall findings of completed studies (44). To address this issue, researchers commonly employ various statistical tools such as funnel plots, Begg and Mazumdar's Rank Correlation Test, and Fail-safe *n*. Fail-safe *n*, as suggested by Rosenthal (38, 45), is used to evaluate the potential impact of unpublished studies on the validity of the published findings. Estimating the number of unpublished studies in a specific research area is challenging. Rosenthal provided a general guideline for Fail-safe *n* without offering statistical criteria for its assessment (38). However, a rule of thumb proposed by Mullen, Muellerleile, and Bryant suggests monitoring the Fail-safe *ratio* ($N/5k+10$) to ensure that the evidence is robust enough to accommodate future results (46). If this ratio exceeds 1, the evidence is considered sufficiently robust.

In this study, participant characteristics, the number of participants, effect sizes, and the application of the MCT model in treating PTSD varied. To generalize the findings to a broader population, a random effect model was utilized. Figure 2 displays the effect sizes of the studies alongside a forest plot.

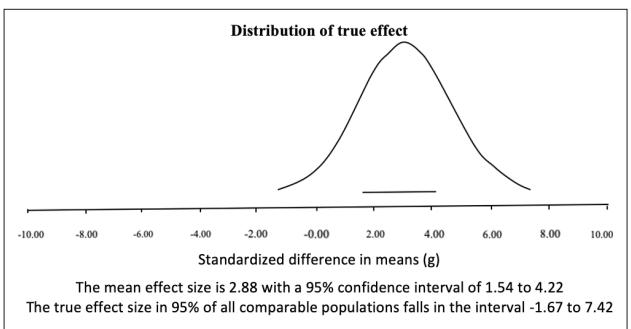

Figure 3. Prediction interval.

For pre- and post-treatment studies, estimation was conducted using the mean differences between pre- and post-treatment assessment scores. In one study, data were analyzed using a paired *t-test*, while another study employed one-way Analysis of Variance (ANOVA) for data analysis.

The Impact of Events Scale (IES) was utilized in five of the studies included in this analysis. The Revised Child Impact of Events Scale (CRIES-13) was employed in another study, and the Mississippi Post-Traumatic Stress Disorder Scale (MPTSDS) was used in an additional study.

RESULTS

Descriptive Statistics

A total of seven unique samples consisting of 99 participants met the inclusion criteria and were

Table 3: Effect size

Model	Effect size						Heterogeneity			
	N	*Effect size*	*SE*	95% CI		*Z*	*p*	*Q*	*df*	*p*	I^2
Fixed	7	1.364	0.177	1.016	1.711	7.688	0.000	49.644	6	0.000	87.914
Random	7	2.878	0.684	1.538	4.219	4.209	0.000				

SE: Standard error; CI: Confidence interval.

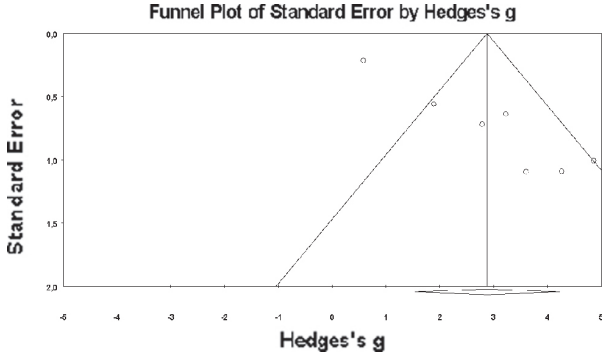

Figure 4. Funnel plot.

Table 4: Studies' effect sizes

Authors	Effect Sizes (Hedges' g)
Wells & Sembi, 2004 (25)	3.610
Wells et al., 2008 (33)	2.792
Wells & Colbear, 2012 (22)	1.895
Zafarizadeh et al., 2014 (34)	4.862
Callinan, Johnson & Wells, 2015 (30)	0.588
Wells et al., 2015 (32)	4.266
Simons & Kursawe, 2019 (31)	3.233
General effect size	2.878

incorporated into the analyses. The participants in the studies had experienced PTSD due to various causes (armed robbery, assault, combat veterans, death of a close family member or friend, domestic violence, fire, peer violence, physical assault, rape, robbery, sexual abuse, sexual assault, suicide attempt by a boyfriend, suicide of a brother, being threatened and held at gunpoint, traffic accidents, unexpected illness, violent physical assault, and combat, as well as witnessing these events) or stressful life events (death of a close one, sexual/physical assault, traffic accident, unexpected illness). Patients were diagnosed with PTSD based on the Structured Clinical Interview according to DSM-IV-TR criteria. The IES, CRIES-13, and MPTSDS scores were used to measure PTSD, with the IES accounting for 71% of the scales in the meta-analysis. Of the participants, 84.85% were from Europe, and 15.15% were from Iran (Table 1).

Effect Size

The comparison of pre- and post-treatment PTSD measures reveals that MCT reduces PTSD symptoms compared to pre-treatment (*k* [number of comparisons])=99, *g*=2.878, 95% CI=1.538–4.219 (Fig. 3). Hedges' *g* indicates a large effect size (Hedges' *g*=2.878). The test's *Z value* is 4.209, with *p*<0.000 (Table 3). A forest plot displaying the effect sizes across all seven studies shows a significant reduction in outcome measures, including PTSD, following MCT treatment (Fig. 2). The effect sizes of the studies are presented in Table 4.

Heterogeneity

According to Table 2, the *Q* statistic result obtained from the heterogeneity analysis was found to be significant (*Q*=792.759, *df*=11, *p*<0.001). The significance of the *Q* statistic indicates the presence of heterogeneity. The I^2 statistic, which expresses the degree of heterogeneity, was found to be 87.914. Since this value is greater than 75, it indicates a high level of heterogeneity (47).

Publication Bias

If the effect sizes of the studies are equally distributed on both sides of the vertical line, this indicates that there is no publication bias (44). However, based on the funnel plot, we can conclude that there is publication bias in the study. To further ascertain the presence of publication bias, the Fail-safe *n* value was examined (Fig. 4). According to this analysis, a Fail-safe *ratio* of 4.08 was obtained for the study, indicating that the weight of evidence is adequate. Since 4.08>1, it can be inferred that there is no publication bias.

Although Begg and Mazumdar mentioned in their article that the use of the Rank Correlation Test is more convenient for large meta-analyses, the Rank Correlation Test was also calculated. Because the *p-value* is 0.23, which is greater than 0.05, we can conclude that there is no publication bias (48).

DISCUSSION

The purpose of this meta-analysis was to investigate the effectiveness of MCT in reducing symptoms of PTSD. We evaluated the effectiveness of MCT treatment on the psychological complaints of PTSD patients by examining the results of 99 patients across seven studies. Since the majority of the studies provided pre- and post-treatment measurements, we calculated effect sizes based on these results. The current results indicate that MCT is effective in reducing PTSD symptoms. However, it should be noted that further studies are needed to confirm the effectiveness of MCT and to explore the optimal techniques for therapy. Given the overall effect size value, we can conclude that MCT is quite effective in the treatment of PTSD.

Heterogeneity was analyzed to investigate the true effect range of the independent variable. The PTSD samples included in our analysis were small and mostly from Europe, resulting in high heterogeneity of PTSD samples. Therefore, the outcomes regarding the types of samples need to be interpreted with caution.

Publication bias was investigated using a funnel plot, Fail-safe *n*, and Begg and Mazumdar's Rank Correlation Test. The results indicated that there was no publication bias in the studies included in our analysis. To prevent publication bias, both published and unpublished studies were considered, as long as they met the inclusion criteria.

In this study, the results of seven experimental studies with pre-test and post-test scores were subjected to a meta-analysis to examine the effectiveness of MCT. These results align with previous studies that have explored the effectiveness of MCT in reducing various psychological complaints. Overall, the findings suggest that MCT may be an effective treatment option for individuals experiencing PTSD. However, it is important to acknowledge that our study has certain limitations. MCT may have led to significant changes in metacognitive beliefs (stimuli reminiscent of the trauma) and processes (such as avoiding emotions, thoughts, and places) during the pre- and post-treatment assessments. According to the principles of MCT, these beliefs and processes are transdiagnostic and play a crucial role in the development and maintenance of psychological complaints (49).

While our study found that MCT is effective for PTSD, other research has also explored the efficacy of MCT for various psychological disorders (50), including depressive disorders (51). Our study included a larger number of trials and was able to more accurately investigate the follow-up effects of MCT compared to previous meta-analyses. However, it also revealed a high degree of heterogeneity among the trials, the potential reasons for which were not fully explored.

Conclusion, Limitations, and Future Research

This study provides evidence supporting the effectiveness of MCT as a treatment technique for PTSD, particularly in altering metacognitive beliefs. As practitioners in mental health treatments, we recommend that counselors integrate MCT into their treatment plans to help their clients overcome maladaptive metacognitions and recover from PTSD symptoms.

Nevertheless, the literature included in this analysis has certain limitations. A primary limitation is that most of the included studies utilized the Impact of Event Scale (IES), a 15-item self-report measure, to assess PTSD symptoms. However, the IES was not originally designed for PTSD assessment. Interestingly, PTSD was recognized as a disorder one year after the scale's development. Shortly thereafter, the IES was incorporated into the trauma diagnostic literature and quickly became the most frequently used instrument for measuring PTSD (52).

In light of advancements in assessing trauma-related reactions, this paper evaluates the continued appropriateness of using the IES. It offers an overview of research that has examined the psychometric properties of the IES and its utility as a diagnostic tool for PTSD. The findings suggest that the IES may not be comprehensive enough for measuring PTSD. Therefore, future meta-analyses should include studies utilizing a variety of PTSD scales to achieve more in-depth and comprehensive results by comparing different measurement instruments.

It should be noted as a limitation that, in four of the studies, one of the researchers was the developer of the model.

The analysis in this study is limited to the mean differences between pre- and post-treatment scores of the single experimental groups. These studies were not randomized controlled trials, and therefore, the comparison of pre- and post-treatment scores could overestimate the actual effect size, reported as 2.9. Future studies should incorporate measures from randomized controlled trials to provide insight into the effectiveness of metacognitive therapy.

Having a small sample size limited the ability to perform secondary analyses and increased the risk of overestimating treatment effects. Additionally, potential bias may have affected the results in approximately one-third of the studies. The majority of the research was

conducted within European cultures, which decreases the generalizability of the findings to other cultures. This suggests that cross-cultural studies are needed. To guide future research, the authors recommend that researchers improve the quality of their research by providing details about the treatments they implement. They should also employ a variety of data collection tools beyond scales, such as self-reflections, field notes, researcher diaries, observations, interviews, etc. Further studies should include study protocols to minimize bias. Finally, future research should focus on the effectiveness of MCT as a transdiagnostic treatment in various clinical populations with PTSD.

Contribution Categories		Author Initials
Category 1	Concept/Design	E.B., G.G.
	Data acquisition	E.B., G.G.
	Data analysis/Interpretation	E.B., G.G.
Category 2	Drafting manuscript	E.B., G.G.
	Critical revision of manuscript	E.B., G.G.
Category 3	Final approval and accountability	E.B., G.G.
Other	Technical or material support	E.B., G.G.
	Supervision	E.B., G.G.

Conflict of Interest: The authors declare that they have no conflict of interest.

Use of AI for Writing Assistance: Not declared.

Financial Disclosure: The authors declare that they have no financial support.

Peer-review: Externally peer-reviewed.

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