Review

THE EFFICACY OF METACOGNITIVE THERAPY FOR ANXIETY AND DEPRESSION: A META-ANALYTIC REVIEW

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Background: *Metacognitive therapy (MCT) is a relatively new approach to treating mental disorders. The aim of the current meta-analysis was to examine the efficacy of MCT in patients with mental disorders.* **Method:** *A comprehensive literature search revealed 16 published as well as unpublished studies on the efficacy of MCT, of which nine were controlled trials. These studies report on 384 participants suffering from anxiety or depression. Treatment efficacy was examined using a random effects model.* **Results:** *On primary outcome measures the aggregate within-group pre- to posttreatment and pretreatment to follow-up effect sizes for MCT were large (Hedges' g = 2.00 and 1.65, respectively). Within-group pre- to posttreatment changes in metacognitions were also large (Hedges' g = 1.18) and maintained at follow-up (Hedges' g = 1.31). Across the controlled trials, MCT was significantly more effective than both waitlist control groups (between-group Hedges' g = 1.81) as well as cognitive behavior therapy (CBT; between-group Hedges' g = 0.97).* **Conclusions:** *Results suggest that MCT is effective in treating disorders of anxiety and depression and is superior compared to waitlist control groups and CBT, although the latter finding should be interpreted with caution. The implications of these findings are limited by small sample sizes and few active control conditions. Future studies should include larger sample sizes and also include comparisons of MCT with other empirically supported therapies. Depression and Anxiety 31:402–411, 2014.*

Key words: *metacognitive therapy; meta-analysis; psychotherapy; anxiety; depression; mental disorders*

INTRODUCTION

Metacognitive therapy (MCT) emerged toward the end of the last century as a novel approach for treating mental disorders.[1] The therapy is based on the metacognitive model of psychological disorder, which can be considered an extension of the cognitive models.[2] Metacognition is defined as cognition about cognition.[3] The metacognitive model is transdiagnostic and proposes that maintenance of all psychopathology is linked to a perseverative thinking style called the cognitive attentional syndrome (CAS).[3] The CAS consists of various forms of repetitive thinking, such as worry, rumination, and threat-oriented attention, as well as unhelpful coping and self-regulatory behaviors, such as avoidance and thought suppression. These practices increase dysfunctional thinking and behavior and reduce attentional flexibility that causes the person to experience low control over negative thoughts and emotions. The CAS is caused and maintained by a person's metacognitions, that is, metacognitive beliefs about control, appraisal, and processing of cognitions and emotions. One example of a maladaptive metacognitive belief is "my thoughts are uncontrollable."[3]

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Consequently, in MCT the CAS is identified in an idiosyncratic case formulation, and treated by identifying and challenging maladaptive metacognitive beliefs. The therapeutic techniques include, for example, attention training, detached mindfulness, and behavioral experiments targeting metacognitions.[3] Attention training is an auditory task, where the patient practices guiding attention toward various sounds. It consists of three stages that are practiced in session and as homework: selective attention, attention switching, and divided attention. The aim is to regain attentional flexibility, strengthen executive control, and thereby interrupt the CAS. Detached mindfulness refers to the ability to be metacognitively aware of internal events, and at the same time detach oneself from them without further engaging in or acting on the thoughts. Metaphors are often used to illustrate and teach the technique. For instance, thoughts can be imagined as clouds drifting away. Behavioral experiments are also used to test the validity of metacognitive beliefs.[3] The exact combination of techniques varies, as a flexible use of the manuals is advocated, based on the individual case formulation.[3] Compared to traditional cognitive behavior therapy (CBT), MCT focuses on the process of thinking, rather than the content of thinking. Although CBT aims to address the validity of negative thoughts, such as "I am worthless," MCT considers these as normal thoughts that for most people are transitory, but can operate as triggers for worry or rumination processes if managed inadequately.[3] The metacognitive view stresses the way one engages in thoughts and addresses the processes responsible for controlling these thoughts. Despite roots in cognitive models, MCT is a stand-alone treatment that uses another set of techniques than those provided by traditional CBT. It shows similarities with third wave therapies, as it focuses on how one manages, observes, and processes thoughts,[4] but compared to these, MCT offers a unique view on how psychopathology is maintained by a sustained thinking style that is centered on a person's metacognitions.

Several clinical trials have demonstrated promising results for MCT. To our knowledge, no systematic reviews of the efficacy of MCT have been published to date. Therefore, the present study aims to provide a meta-analytic review of the efficacy of MCT. More specifically, we examined the effect of MCT on each study's primary outcome variable as well as the effect on anxiety and depression symptoms. Furthermore, we examined changes in metacognitions that are assumed to explain the maintenance of mental disorders and to mediate the efficacy of MCT.

METHOD

ELIGIBILITY CRITERIA

Studies were included in the meta-analysis if (1) the study evaluated MCT as developed by Adrian Wells, (2) the MCT condition had a sample size of at least five patients at pretreatment, (3) participants met diagnostic criteria for a mental disorder according to the Diagnostic Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD), and (4) participants were older than 17 years.

In order to include as many trials as possible, no a priori restrictions were placed on intervention format (i.e., individual/group), publication type, study design (i.e., with/without control groups), or statistical presentation of results. If a study did not provide sufficient data for performing the meta-analysis, we attempted to retrieve these data from the authors. We included studies where patients were taking psychotropic medication concomitantly. Studies that combined MCT with other types of therapy, for example, CBT, and trials examining specific MCT techniques instead of the treatment as a whole, were excluded. We included studies written in English, Danish, Norwegian, Swedish, Dutch, or German, that is, the languages that at least one of the authors is proficient in.

LITERATURE SEARCH

First, studies were identified by searching the databases PsycINFO, PubMed, and the Cochrane Library, using the search string "(metacognitive or meta-cognitive) AND (therapy OR trial OR treatment OR psychotherap* OR intervention)" in keywords, titles, and abstracts. Google Scholar was searched only using the term "metacognitive therapy", as the full search string yielded more hits than the database was able to display, that is, maximum 1000. The searches were conducted from 1994 and forward, which represents the year where the theoretical underpinnings of the metacognitive model of psychological disorder was first presented.[5] Second, trial registries were searched for ongoing and completed trials of MCT (www.controlled-trials.com; www.clinicaltrials.gov), and authors of relevant trials were contacted to discuss the possibility of inclusion in the current meta-analysis. Third, a backward search of the reference lists of all included trials was conducted. Fourth, all main authors of the included studies were asked for additional potentially relevant published or unpublished trials. The literature search was conducted in March 2014.

EXTRACTION OF STUDY CHARACTERISTICS

A range of study characteristics were coded and extracted from each study, including the number of participants, attrition rates, publication year, comparison group, and follow-up period. With regard to intervention characteristics, the format (individual/group) and duration of MCT were extracted. With respect to participant characteristics, we coded primary mental disorder, age, gender, and comorbidity rates with other mental disorders.

EXTRACTION OF DATA FOR THE META-ANALYSIS

An a priori decision was made to determine one outcome measure in each of the following categories: primary outcome, anxiety, and depression. In order to minimize heterogeneity in outcome data, the primary outcome measure was determined based on which measure was most commonly available for the primary disorder, and furthermore best represented the criteria of DSM-IV for the specific disorder. For example, for generalized anxiety disorder (GAD) the most commonly available measures were the Penn State Worry Questionnaire (PSWQ) and State-Trait Anxiety Inventory-Trait version (STAI-T). Because worry is considered a cardinal symptom of GAD (as measured by the PSWQ), and because some studies used the STAI-T as a general measure for anxiety, the PSWQ was identified as the first choice of primary outcome for GAD. In order to examine symptom change in our secondary outcome domains, anxiety and depression, scores were extracted when possible. Although the primary outcome measures were chosen for their specific relevance to the primary mental disorder, the secondary outcome measures of anxiety and depression were less disorder-specific. For the vast majority of studies, these were

the Beck Anxiety Inventory and Beck Depression Inventory. Measures of metacognitions were also extracted, with the majority of studies using the Metacognitive Questionnaire. Other measures were included if they measured metacognitive beliefs or processes specified in the metacognitive model. All study characteristics were double-coded by two of the authors (NN and either NM or AvE) to ensure accuracy, and discrepancies were resolved by jointly reviewing each characteristic.

CODING OF RISK OF BIAS AND METHODOLOGICAL CHARACTERISTICS

In order to detect potential biases in the individual studies, the Cochrane Collaboration's tool for assessing risk of bias was used.[6] The main domains of bias assessed include selection bias, detection bias, attrition bias, reporting bias, performance bias, and "other biases." A judgment of (1) low risk, (2) unclear, or (3) high risk of bias is given within each domain. Minor adaptations of the tool were made to enable us to assess psychotherapy studies: When coding for blinding of outcome assessment, we distinguished between self-report measures and clinician-rated measures. Performance bias was not coded, as it is not feasible to blind therapists and clients to a psychotherapeutic intervention. In noncontrolled trials, we only coded for attrition bias, reporting bias, and other biases.

In order to further assess the methodological characteristics of each study, we used the rating scale developed by Öst.[7] The scale consists of 22 items that are rated as *good* (2), *fair* (1), or *poor* (0), each referring to a specific methodological characteristic. A rating of 0 was given if the study provided insufficient information on an item.

For both assessments, interrater reliability was determined after consensus-coding two studies and double-rating the remaining studies. All studies were rated by two of the authors (NN and either NM or AvE), except the study published in Norwegian,[8] which was only coded by one author (NN) for language reasons. Disagreements in the coding were resolved by a third rater (either NM or AvE). For the Cochrane Tool, the intraclass correlations using a two-way random model were .71, 95% CI (.53–.82) and .83, 95% CI (.70–.90), respectively. For the methodology rating scale these numbers were .83, 95% CI (.78–.87) and .87, 95% CI (.82–.90), respectively, indicating acceptable interrater agreement.

STATISTICAL ANALYSES

The software program, Comprehensive Meta-Analysis (2.2), was used to carry out the meta-analysis. Because of the variations in methods and samples of the primary studies, a random effects model was employed. When using random effects, the studies are considered to be a random sample of a larger, underlying population. Hence, differences in the effects across studies are assumed to result not only from sampling error, but also from true differences between the studies.[9] Analyses were based on intent-to-treat data to the extent possible.

Within-group effect sizes were calculated based on pre- to posttreatment changes on the primary outcome measures, and if available on measures of anxiety, depression, and metacognitions. When possible, within-group effect sizes for pretreatment to follow-up changes were also computed. Between-group effect sizes were calculated for MCT compared to waitlist control (WLC) and CBT for pre- to posttreatment changes. Next, the within-group and between-group effect sizes were aggregated into weighted mean effect sizes.[10] The formula for Hedges' *g* was chosen, because it corrects for bias in small samples.[11] Like Cohen's *d*, it is based on the standardized mean difference, and values of .8, .5, and .2 refer to effect sizes of large, medium, and small magnitude, respectively.[12] For one study,[13] effect sizes were based on *t* values; for all other studies, effect sizes were calculated from the means and standard deviations at the various measurement points.

The correlation between the measures at the various time points was needed to calculate effect sizes, and these were not provided in the articles. We managed to retrieve these correlations from the authors of four of the studies. As recommended by Morris and DeShon,[14] a preliminary meta-analysis was conducted on these studies using a random effects model. The within-group correlation was .32, 95% CI (.12–.49), and the between-group correlation was 0.44, 95% CI (.37–.50). Thus, the remaining correlations were conservatively estimated at $r = .50$, corresponding to the upper limits of these confidence intervals.

The I^2 test was used as a measure of heterogeneity across the effect size distributions, that is, due to true differences rather than chance. I^2 values of 25, 50, and 75% may be interpreted as referring to low, moderate, and high levels of heterogeneity, respectively.[15] Cochran's *Q* and its *P*-value aided in determining statistically significant differences across the effect sizes. Further, Duval and Tweedie's[16] trim-and–fill procedure was employed to estimate the main effect size (Hedges' *g*) corrected for publication bias. Finally, subgroup analyses were conducted in order to assess possible variations in the effect sizes.

RESULTS

SEARCH RESULTS AND STUDY SELECTION

Figure 1 illustrates the study selection process. With the exception of three small-scale studies,[17–19] the search revealed that studies of MCT were primarily conducted on patients with anxiety or depression. Accordingly, a post hoc decision was formulated to focus on trials examining MCT for depression and anxiety disorders only. The search yielded 2120 hits, of which 16 studies met our eligibility criteria and were included in the meta-analysis. Fifteen of the studies were found via database searches. The sixteenth study[20] was identified through inquiries to the authors of the included articles. As for the study with the improbably high effect size,[21] it was initially selected, but excluded at the stage of data analysis, as it would have strongly impacted the aggregate effect size ($g = 11.02$, 95% CI [4.75–17.29]), and an attempt to contact the authors for clarification was unsuccessful.

STUDY CHARACTERISTICS

Table 1 provides an overview of the included studies, together with the effect sizes for the individual studies. Four studies were unpublished, including a doctoral dissertation,[22] two master theses,[8,23] and a manuscript in preparation.[20] The remaining studies were articles published in peer-reviewed journals. A large number of the trials were carried out in the United Kingdom ($N = 8$). Three trials were conducted in Norway, two in Iran, two in the Netherlands, and one in Australia.

Three hundred eighty-four patients were included in the analyses. In the studies by Wells et al.[24] and Van der Heiden, Muris, and Van der Molen,[25] data from the control patients who were offered treatment after the waiting period were also included in the treatment analyses, thus data from these samples were meta-analyzed twice and reported in different groups. Two hundred thirty-four participants were treated in MCT conditions, 112 in CBT conditions, and 73 were allocated to

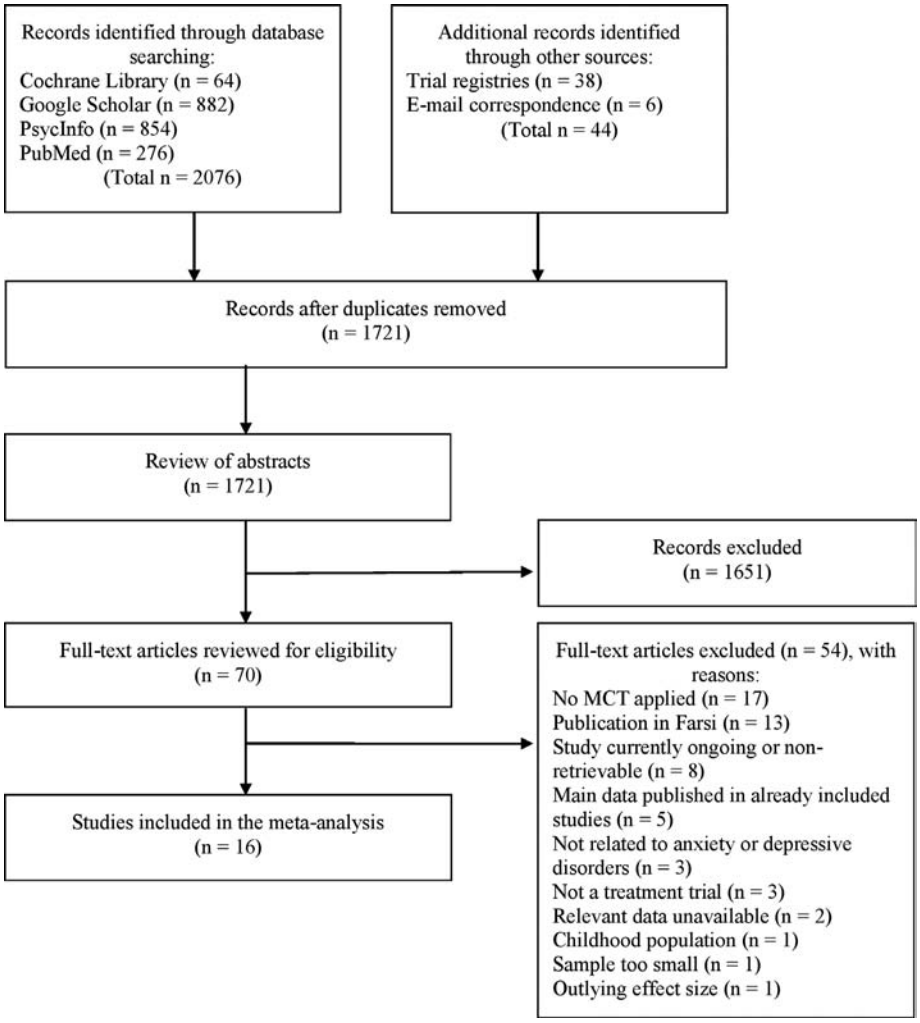

Figure 1. Study selection process.

waitlists. The mean total number of participants across studies was 24 (SD = 29.51). All participants were outpatients with mental disorders, including obsessive-compulsive disorder ($N = 2$), posttraumatic stress disorder ($N = 4$), GAD ($N = 5$), major depressive disorder ($N = 3$), and postpartum depression ($N = 1$). One study examined a patient group with various primary disorders, but mainly anxiety and depression. In general the reported comorbidity rates were high, ranging between 50 and 100% for DSM-IV disorders. Of note, these rates primarily refer to Axis I disorders, as Axis II disorders were assessed in only four studies.[8,23–25] Two studies did not report comorbidity. All diagnoses were established using structured clinical interviews.

Table 2 provides an overview of the methodological characteristics across the included studies. The studies share a number of strengths. In general the samples were well described, treatment programs were replicable, and results were adequately presented. The outcome measures were questionnaires or clinician-rated interviews specific to the disorder under study and had adequate psychometric properties. Concomitant treatments were in general well controlled for, for example, studies in which patients were taking psychotropic medication demanded a stable dosage of medication during the trial.

STUDY DESIGNS

Nine studies were controlled trials, and seven were uncontrolled. Of the uncontrolled studies, four were open trials and three used single-case designs. All controlled studies were randomized, except Wells et al.,[24] which used a baseline-controlled design in which participants received MCT after a baseline period. Shareh et al.[26] included two active treatment control conditions, that is, pharmacotherapy and MCT combined with pharmacotherapy. Since this was the only study using these comparison groups, no meta-analytic synthesis of the associated between-group effect sizes could be made.

TABLE 1. Study characteristics

Study	Disorder	Primary outcome	Comparison	*n* Analyzed	Percent attrition	Follow-up months	Percent female	Mean age	Comorbidity	Therapy sessions	Hedges' *g*
Bevan et al. (2013)[30]	PPD	BDI	–	6	0	(6)	100	34	–	(8–12)	2.21
Kvistedal (2011)[23]	GAD	PSWQ	CBT + WLC	42	2.4	–	69	36.51	65%	(8–12)	2.28
Nordahl (2009)[27]	Mixed	BAI	CBT	28	6.7	–	61	36.1	57 diagnoses on $n = 28$	7.5	2.49
Nordahl (2013)[8]	MDD	BDI	–	5	0	6	80	30	60%	10	2.12
Proctor (2008)[22]	PTSD	PDS	Exposure therapy + WLC	32	6.3	(6)	37.5	41	56.3%	8	2.59
Rees and van Koesveld (2008)[28]	OCD	Y-BOCS	–	8	11.1	3	75	(21–58)	50%	13	1.49
Shareh and Dolatshahi (unpublished manuscript)[20]	MDD	BDI	WLC	20	16.7	–	70	–	–	8	3.79
Shareh et al. (2010)[26]	OCD	Y–BOCS	–	7	0	–	42.9	24.7	0%	10	3.24
van der Heiden et al. (2012)[25]	GAD	PSWQ	IUT + WLC	126	20.6	6	73	35.0	63%	12.3	1.59
van der Heiden et al. (2013)[38]	GAD	PSWQ	–	33	27.3	(6)	63.6	31.33	73%	12.9	1.14
Wells and Sembi (2004)[13]	PTSD	IES	–	6	0	(18–41)	83.3	35.2	100%	9	3.61
Wells and King (2006)[39]	GAD	STAI-T	–	8 (10)[a]	0	12	60	(25–75)	50%	7.4	2.54
Wells et al. (2008)[40]	PTSD	IES	–	11	15.4	6	54.5	38.9	54.5%	8.5	2.80
Wells et al. (2010)[31]	GAD	PSWQ	Applied relaxation	20	0	12	60	49.05	80%	(8–12)	2.57
Wells et al. (2012) BRAT[24]	MDD	BDI	WLC (baseline)	12	16.7	12	91.7	34.5	75%	6.5	1.41
Wells and Colbear (2012) JCP[32]	PTSD	PDS	WLC	20	10	6	55	37.4	35 diagnoses on $n = 20$	6.4	0.97

Note: Information is based on the whole sample, or on the MCT group where information on the whole sample was not available. Percent attrition is at posttreatment. Follow-up months indicate the longest follow-up period, and parenthesis indicates that the follow-up was not used in the analyses. Means are given for therapy sessions, and range is stated in parenthesis if means were not available. Hedges' *g* indicates the within-group effect sizes from pre- to posttreatment. Total *n* refers to number of participants that data were available for.

[a]Eight analyzed for primary outcome, 10 for secondary outcomes.

BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory; CBT, cognitive behavior therapy; GAD, generalized anxiety disorder; IES, Impact of Events Scale; IUT, intolerance-of-uncertainty therapy; MDD, major depressive disorder; OCD, obsessive-compulsive disorder; PDS, Posttraumatic Stress Diagnostic Scale; PPD, postpartum depression; PSWQ, Penn State Worry Questionnaire; PTSD, posttraumatic stress disorder; WLC, waitlist control; Y-BOCS, Yale–Brown Obsessive-Compulsive Scale.

TABLE 2. Methodological quality ratings of the included studies

Variable	Mean (SD)
1. Clarity of sample description	1.81 (0.40)
2. Severity/chronicity of the disorder	1.25 (0.45)
3. Sample representativeness	1.44 (0.73)
4. Reliability of the diagnosis	1.13 (0.34)
5. Specificity of outcome measures	2.00 (0.00)
6. Reliability and validity of outcome measures	2.00 (0.00)
7. Use of blind evaluators	0.19 (0.40)
8. Assessor training	0.25 (0.45)
9. Assignment to treatment (only controlled trials)	0.63 (0.72)
10. Design	0.75 (1.00)
11. Power analysis	0.06 (0.25)
12. Assessment points	1.00 (0.73)
13. Manualized treatment programs	1.94 (0.25)
14. Number of therapists	0.44 (0.51)
15. Therapist training	1.00 (0.89)
16. Checks for treatment adherence	0.25 (0.45)
17. Checks for therapist competence	0.00 (0.00)
18. Control of concomitant treatments	1.00 (0.52)
19. Handling of attrition	1.25 (1.00)
20. Statistical analyses and presentation of results	1.81 (0.40)
21. Clinical significance	1.75 (0.68)
22. Equality of therapist hours (only active control)	1.20 (1.10)[a]

Note: Items were rated as good (2), fair (1), or poor (0).
[a]Based on five studies.

METACOGNITIVE THERAPY (MCT)

MCT followed various published and unpublished disorder-specific manuals and guidelines developed by Wells and colleagues. These manuals are flexible in nature in the sense that they stress the importance of applying the treatment structure and content according to the needs of the individual client and the corresponding case formulation.[3] Nordahl[27] combined a treatment manual for GAD with attention training for the heterogeneous patient group. Two studies[20,28] used unpublished manuals adapted from published MCT manuals[3,29] to a group format. For treating postpartum depression,[30] the manual for major depressive disorder was used.[3]

The number of sessions provided ranged between 3 and 15, and the length of the individual sessions ranged between 30 and 60 min. The session length for the group therapies[20,28] ranged between 90 and 120 min. Sessions were generally scheduled on a weekly basis. The mean number of therapy sessions was 10.71 (SD = 2.06).

CONTROL CONDITIONS

Six studies compared MCT with a WLC condition. In the study by Wells et al.,[24] a baseline assessment ranging from 3 to 6 weeks was used as a WLC. Five studies used active treatment control conditions that were based on various types of cognitive and/or behavioral procedures. These include intolerance of uncertainty therapy,[25] CBT,[23] and applied relaxation for GAD,[31] exposure therapy for posttraumatic stress disorder,[22] and CBT for mixed refractory cases.[27] For the present meta-analysis, these control interventions were combined into one CBT group.

FOLLOW-UP

Follow-up assessments were conducted in 12 studies, eight of which provided sufficient information to be included in the meta-analysis. The lengths of the included follow-up periods varied between 3 and 12 months, with a mean of 7.88 (SD = 3.56).

RISK OF BIAS

Table 3 provides an overview of the potential biases of the studies. The risks of bias were generally low or unclear. There was an unclear risk of reporting bias across the studies, and in three trials there was an unclear risk of selection bias. Several of the clinician-rated outcome assessments received an unclear risk of bias. However, only one of these outcome assessments was actually used in the meta-analytic outcomes.[26]

META-ANALYTIC OUTCOMES

Within-Group Analyses. Table 4 displays within-group aggregate effect sizes for the included studies' primary outcome measures and for measures of anxiety, depression, and metacognitions. The pre- to posttreatment effect size on the primary outcome measures for all 16 studies was $g = 2.00$, 95% CI (1.61–2.38), $P < .001$. This effect was largely maintained over time, as evidenced by the pretreatment to follow-up effect size, $g = 1.68$, 95% CI (1.37–1.94), $P < .001$. The individual study pre- to posttreatment effect sizes for the primary outcome measures ranged from $g = 0.97$[32] to 3.79,[20] as displayed in Table 1. MCT also resulted in large and significant reductions of anxiety, depression, and dysfunctional metacognitions, and these changes were all maintained at follow-up.

Between-Group Analyses. Figure 2A and B display the pre- to posttreatment effect sizes and forest plots for MCT compared with CBT and WLC for the primary outcome measures. The aggregate effect size for the studies comparing MCT to WLC was $g = 1.81$, 95% CI (1.26–2.36). Compared to CBT, a large effect size was found favoring MCT, $g = 0.97$, 95% CI (0.59–1.35). Both effect sizes were highly significant (Ps < .001). Pre-treatment to follow-up analyses for MCT compared with CBT were not conducted, as only two studies could be included.

HETEROGENEITY

For the pre- to posttreatment within-group effect size on primary outcome measures I^2 was 57.08%, 95% CI (25.07–75.41), $Q = 34.95$, $P = .003$, indicating moderate to high heterogeneity across the studies. At follow-up a nonsignificant degree of heterogeneity was observed ($I^2 = 0.00$, 95% CI (0.00–50.50), $Q = 3.48$, $P = .843$). For the pre- to posttreatment comparison of MCT with

TABLE 3. Risk of bias in the included studies

	Selection bias		Detection bias		Attrition bias	Reporting bias	Other bias
Study	Random sequence generation	Allocation concealment	Blinding of outcome assessment, self-reported	Blinding of outcome assessment, clinician-rated	Incomplete outcome data	Selective reporting	Other sources of bias
Bevan et al. 2013[30]	–	–	–	–	Low	Unclear	Low
Kvistedal (2011)[23]	Low	Unclear	Low	Low	Low	Unclear	Low
Nordahl (2009)[27]	Low	Low	Low	Low	Low	Unclear	Low
Nordahl (2013)[8]	–	–	–	–	Low	Unclear	Low
Proctor (2008)[22]	Low	Low	Low	High	Low	Unclear	Low
Rees and van Koesveld (2008)[28]	–	–	–	–	Low	Unclear	Low
Shareh and Dolatshahi (unpublished manuscript) [20]	Unclear	Unclear	Low	Unclear	Unclear	Unclear	Low
Shareh et al. (2010)[26]	Unclear	Unclear	Low	Unclear	Low	Unclear	Low
van der Heiden et al. (2012)[25]	Low	Low	Low	Low	Low	Unclear	Low
van der Heiden et al. (2013)[38]	–	–	–	–	Low	Unclear	Low
Wells and Sembi (2004)[13]	–	–	–	–	Low	Unclear	Low
Wells and King (2006)[39]	–	–	–	–	Low	Unclear	Low
Wells et al. (2008)[40]	–	–	–	–	Unclear	Unclear	Low
Wells et al. (2010)[31]	Low	Low	Low	Unclear	Low	Unclear	Low
Wells et al. (2012) BRAT[24]	–	–	–	–	Low	Unclear	Low
Wells and Colbear (2012) JCP[32]	Low	Low	Low	Unclear	Low	Unclear	Low

CBT, heterogeneity was low to moderate, $I^2 = 36.61\%$, 95% CI (0.00–76.29), $Q = 6.31$, $P = .177$. Moderate to high heterogeneity was found for the comparison with WLC, $I^2 = 56.66\%$, 95% CI (0.00–82.53), $Q = 11.55$, $P = .042$. The possible sources of heterogeneity were further investigated by undertaking subgroup analyses.

SUBGROUP ANALYSES

Table 5 displays the results of the subgroup analyses. No indications of differences in effect were found for controlled versus uncontrolled trials and anxiety versus depression trials. A significantly lower effect size was found for studies that had applied intent-to-treat analyses as opposed to those that had not. An intermediate effect size was found for studies that had attrition rates of 0%. Because the originator of MCT (Adrian Wells) authored seven of the studies, the possibility of allegiance bias was examined by comparing the results of these seven studies with the remaining studies. This yielded no indication of allegiance bias.

TABLE 4. Pre- to posttreatment and pretreatment to follow-up within-group effect sizes

	Posttreatment				Follow-up			
Domain	Hedges' *g*	95% CI	*k*	Z	Hedges' *g*	95% CI	*k*	Z
Primary outcome	2.00	1.61–2.38	16	10.26	1.68	1.36–1.94	8	11.08
Anxiety	1.54	1.23–1.84	14	9.91	1.22	0.92–1.52	7	7.98
Depression	1.39	1.12–1.66	12	10.05	1.15	0.91–1.38	6	9.57
Metacognitions	1.18	0.92–1.45	10	8.82	1.31	1.05–1.57	6	9.83

k, number of studies included in the analysis.
Effect sizes were based on the following questionnaires: for anxiety—Beck Anxiety Inventory; Hospital Anxiety and Depression scale-Anxiety; State-Trait Anxiety Inventory-Trait. For depression: Beck Depression Inventory and Hospital Anxiety and Depression scale-Depression. For metacognitions: Anxious Thoughts Inventory-Meta Worry; Thought Control Questionnaire-Worry; pooled results of the positive and negative subscales of Metacognitive Questionnaire (MCQ) or MCQ-30.
All *P*s < .001.

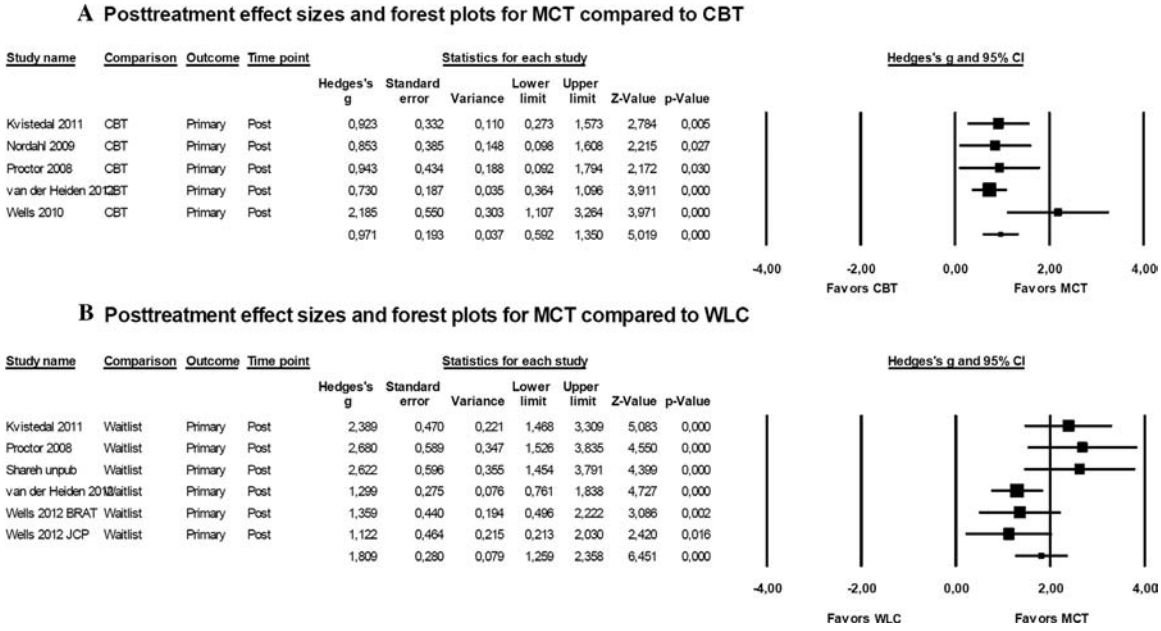

Figure 2. (A) Pre- to posttreatment effect sizes and forest plots for MCT compared to CBT, (B) pre- to posttreatment effect sizes and forest plots for MCT compared to WLC.

PUBLICATION BIAS

A funnel plot was constructed in order to inspect the possibility of publication bias, and a trim-and-fill procedure[16] was employed. For the pre- to posttreatment within-group analyses, seven studies would need to be added to make the plot symmetric, all falling to the left of the mean, that is, toward a lower effect size. The effect size corrected for publication bias was $g = 1.61$, 95% CI (1.23–1.98). This reduction was within the 95% confidence interval of the original analysis ($g = 2.00$, 95% CI [1.61–2.38]), however at its lowest end. This suggests that the analyses may be marginally overestimated.

DISCUSSION

In this systematic review and meta-analysis, we found MCT to be highly effective in treating depression and anxiety disorders. Large within-group effect sizes were found across all 16 trials from pre- to posttreatment, and treatment gains were maintained at follow-up. Treatment gains following MCT were large when compared to WLC. Further, based on a small sample of studies, MCT also demonstrated significantly larger treatment effects than CBT.

As for the changes in metacognitions, MCT demonstrated a large effect size from pre- to posttreatment as well as from pretreatment to follow-up. The observed changes in metacognitions support the theoretical rationale of MCT, that is, that maladaptive metacognitive beliefs and processes maintain psychological distress and that therapeutic change in MCT may be achieved via metacognitive change.[3] However, the current results do not provide any indication of the temporal causality between symptom changes and metacognitive changes, and more work is needed to delineate the specific role of metacognitive change in MCT, for example, by employing mediation models.

TABLE 5. Effect sizes based on subgroup characteristics

Subgroup analyses		Hedges' *g*	95% CI	*K*	*z*
Design	Controlled studies	2.06	1.54–2.57	9	7.84
	Uncontrolled studies	1.96	1.32–2.6	7	5.99
Disorder	Anxiety	1.92	1.48–2.37	11	8.41
	Depression	2.18	1.24–3.12	4	4.55
Handling of attrition	Intent-to-treat	1.39	1.01–1.77	5	7.16
	Completers, w/attrition	2.62	2.06–3.08	5	9.14
	Completers, w/no attrition	2.17	1.63–2.71	6	7.86
Allegiance	Originator authoring	2.02	1.34–2.70	7	5.81
	Others authoring	2.03	1.53–2.52	9	8.00

Note: All *P*s < .001. All subgroup analyses are based on within-group pre-to posttreatment effect sizes on primary outcome measures.

Across the controlled trials, MCT was more effective than WLC as well as CBT. The latter finding, however, should be interpreted with caution, as it is based on five studies only, most of which had rather small samples. In addition, there were marked variations in the types of CBT procedures employed, which reduces the generalizability of this finding with regard to specific CBT procedures or CBT per se. Yet, the considerably greater efficacy of MCT over CBT warrants further investigation into whether, and for whom, MCT may be more effective than CBT.

Substantial reductions were also found in secondary symptoms of anxiety and depression, which indicates that MCT not only reduces symptoms related to patients' primary diagnosis, but also common comorbid symptoms. This supports the theory's notion of a common underlying style of thinking that maintains psychological distress across disorders.[3] This might suggest that MCT has a potential in effectively treating psychopathology from a transdiagnostic angle.[33] It must be noted, however, that slightly lower effect sizes were found for the secondary outcome measures of anxiety and depression as compared to the primary outcome measures. This may of course be explained by the fact that the primary outcome measures were more specific to the disorder in question, and that the primary symptoms were directly targeted in therapy due to the use of disorder-specific manuals. Yet, given the relatively small amount of studies reporting on the efficacy of MCT on secondary outcome measures of anxiety, depression, and metacognition, these results should be interpreted as preliminary.

In general, the effect sizes found in this meta-analysis were very large compared to previous meta-analyses of psychological treatments for anxiety and depression.[34,35] One implication of the current findings is that MCT yields larger effects than previous treatments. However, given the lack of large trials with low risk of biases, it may be premature to draw such conclusions. An important aspect to consider in meta-analyses is the role of researcher allegiance that has proven to be positively associated with treatment outcome in meta-analyses.[36] However, we found no indications of such associations when comparing the effect sizes in trials with the originator of MCT with the remaining trials, and the available information about other authors of the included studies did not indicate that these might be associated with allegiance.

Two important limitations of this meta-analysis should be kept in mind when interpreting the results. First, the results are based on studies of which the majority used relatively small sample sizes. Although a meta-analysis increases power by combining multiple study results, it does not protect against the biases associated with small sample sizes in the individual studies, for instance with respect to obtaining a representative sample. Some methodological characteristics of small studies may further increase the risk of confounding factors. These include small numbers of therapists, lack of blinding, and absence of checks of interrater reliability and protocol adherence. Second, our risk of assessment bias in the studies indicated possible biases in the selection process for the controlled trials and possible reporting bias, that is, the possible existence of unreported findings. These risks of biases may or may not have affected the results. More trials with low risk of biases are needed in order to clarify this issue.

The heterogeneity of effects across all 16 studies was found to be moderate to high. The subgroup analyses suggest that the lack of intent-to-treat analyses may have lead to an overestimation of the effect sizes that in part may explain this heterogeneity. Due to lack of variation in the respective risk of bias domains, moderator analyses were not deemed appropriate. Further, the relatively small number of studies included in this meta-analysis did not allow for meaningful subgroup analyses of factors, such as intervention format (individual/group), use of measurement, and type of primary disorder, which may also partly explain the heterogeneity of our findings.

It should be noted that the therapists in the included studies received relatively little training in MCT, which suggests that the large effects sizes cannot be attributed to the involvement of specialized clinicians. This supports the generalizability of our findings to real-world circumstances in clinical practice. Yet, several therapists had clinical experience from other therapies and ongoing supervision was typically provided, in some cases by the originator of the therapy. This indicates that therapists not yet familiar in applying MCT might need continuous supervision to match the effect sizes found in this meta-analysis. Further, although MCT is based on a manualized approach, it differs from most manualized approaches by being case formulation-based. Thus, protocols are less detailed and rely to a higher degree on the therapist to make decisions about the course of treatment, further underlining the importance of training in the approach. The fact that MCT manuals are less detailed points to a need for future studies to assess treatment fidelity in order to shed light on adherence and competence in applying these manuals.

Examination of attrition rates (between 0 and 28.57% at posttreatment) indicates that MCT might be somewhat better tolerated compared to other psychotherapies. For instance, the weighted mean attrition rate in a meta-analysis of CBT for anxiety disorders was 23%.[37] This may indicate that that the therapeutic tools used in MCT are generally well accepted and manageable by patients with depression or anxiety disorders, possibly because MCT does not aim at exposure. However, the rather low attrition rates reported in the included studies might also be related to investigator's and therapist's involvement with the specific participants. It should also be noted that the large effects were obtained in relatively few treatment sessions (mean: 10.7), underscoring the potential cost-effectiveness of MCT.

In sum, this meta-analysis has shown that MCT effectively alleviates symptoms of anxiety and depression,

and it provides promising preliminary results when compared to CBT. Future studies should strive to use sufficiently powered randomized designs and compare the efficacy of MCT to other empirically supported treatments.

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