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In Review

A Meta-Analysis of Cognitive-Behavioural Therapy for Adult Depression, Alone and in Comparison With Other Treatments

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Objective: No recent meta-analysis has examined the effects of cognitive-behavioural therapy (CBT) for adult depression. We decided to conduct such an updated meta-analysis.

Methods: Studies were identified through systematic searches in bibliographical databases (PubMed, PsycINFO, Embase, and the Cochrane library). We included studies examining the effects of CBT, compared with control groups, other psychotherapies, and pharmacotherapy.

Results: A total of 115 studies met inclusion criteria. The mean effect size (ES) of 94 comparisons from 75 studies of CBT and control groups was Hedges *g* = 0.71 (95% CI 0.62 to 0.79), which corresponds with a number needed to treat of 2.6. However, this may be an overestimation of the true ES as we found strong indications for publication bias (ES after adjustment for bias was *g* = 0.53), and because the ES of higher-quality studies was significantly lower (*g* = 0.53) than for lower-quality studies (*g* = 0.90). The difference between high- and low-quality studies remained significant after adjustment for other study characteristics in a multivariate meta-regression analysis. We did not find any indication that CBT was more or less effective than other psychotherapies or pharmacotherapy. Combined treatment was significantly more effective than pharmacotherapy alone (*g* = 0.49).

Conclusions: There is no doubt that CBT is an effective treatment for adult depression, although the effects may have been overestimated until now. CBT is also the most studied psychotherapy for depression, and thus has the greatest weight of evidence. However, other treatments approach its overall efficacy.

Une méta-analyse de la thérapie cognitivo-comportementale pour la dépression adulte, seule et en comparaison avec d'autres traitements

Objectif : Aucune méta-analyse récente n'a examiné les effets de la thérapie cognitivo-comportementale (TCC) sur la dépression adulte. Nous avons décidé de mener cette mise à jour de méta-analyses.

Méthodes : Des études ont été identifiées lors de recherches systématiques dans les bases de données bibliographiques (PubMed, PsycINFO, Embase, et Cochrane library). Nous avons inclus des études qui examinent les effets de la TCC, comparé à des groupes témoins, d'autres psychothérapies, et la pharmacothérapie.

Résultats : Un total de 115 études satisfaisaient aux critères d'inclusion. L'ampleur (AE) moyenne de l'effet de 94 comparaisons dans 75 études de TCC et de groupes témoins

était au *g* de Hedges de 0,71 (IC à 95 % 0,62 à 0,79), ce qui correspond au nombre nécessaire pour traiter, soit 2,6. Toutefois, ceci peut être une surestimation de la véritable AE car nous avons trouvé de fortes indications de biais de publication (l'AE après correction pour biais était *g* = 0,53), et parce que l'AE des études de qualité supérieure était significativement plus faible (*g* = 0,53) que celle des études de qualité inférieure (*g* = 0,90). La différence entre les études de qualité supérieure et inférieure demeurait significative après correction pour d'autres caractéristiques des études dans une analyse de régression multivariée. Nous n'avons trouvé aucune indication que la TCC soit plus ou moins efficace que d'autres psychothérapies ou que la pharmacothérapie. Le traitement combiné était significativement plus efficace que la pharmacothérapie seule (*g* = 0,49).

Conclusions : Il n'y a aucun doute que la TCC est un traitement efficace de la dépression adulte, bien que les effets aient pu en être surestimés jusqu'ici. La TCC est également la psychothérapie pour la dépression la plus étudiée, et elle a donc la plus grande évidence. Toutefois, d'autres traitements s'approchent de son efficacité globale.

Cognitive-behavioural therapy is the most researched form of psychotherapy for adult depression. However, meta-analytic reviews of the research on CBT for depression have varied in important manners in that some were focused closely on Beck's approach to cognitive therapy,[1] whereas others have employed a broader definition of the cognitive-behavioural approach to depression.[2] Further, although the number of comparative studies examining different types of psychotherapy has continued to increase,[3] no recent meta-analysis has focused specifically on CBT for depression.

Early meta-analyses all showed CBT to be more effective than no treatment for people with depression,[4–8] although no firm evidence was found that CBT was any more or less efficacious than other psychotherapies or pharmacotherapy.

No recent meta-analysis has specifically focused on effect studies of CBT, and examined potential effect moderators and other sources of heterogeneity.

Therefore, our study provides an updated meta-analysis of CBT for the treatment of adult depression. We employed a broad definition of CBT,[2] and compared CBT with control groups, pharmacotherapy, and other psychotherapies. One aim was to use the large number of available studies to compare CBT with wait-list, CAU, and placebo control groups. We also compared CBT with other psychotherapies, including nondirective supportive therapy, BA therapy, psychodynamic psychotherapy, IPT, PST, and other psychotherapies.

Clinical Implications

- CBT is an effective treatment for adult depression.
- Although there is no evidence that CBT is more effective than other psychotherapies, it remains the best-studied type of therapy.
- Combined treatment of CBT and pharmacotherapy is significantly more effective than pharmacotherapy alone.

Limitations

- Heterogeneity was high in all analyses, indicating considerable differences between the ES of the different studies.
- Only short-term effects were examined.
- The quality of a considerable number of included studies was low.

Abbreviations

BA	behavioural activation
BDI	Beck Depression Inventory
CAU	care as usual
CBT	cognitive-behavioural therapy
CMA	Comprehensive Meta-Analysis
CT	cognitive therapy
ES	effect size
HRSD	Hamilton Rating Scale for Depression
IPT	interpersonal psychotherapy
NNT	number needed to treat
PST	problem-solving therapy
RCT	randomized controlled trial

Method

Identification and Selection of Studies

We used a database of 1237 papers on the psychological treatment of depression. This database has been described by Cuijpers et al[9] and has been used in a series of earlier meta-analyses.[10] The database is continuously updated and was developed through a comprehensive literature search (from 1966 to January 2011) in which 12 368 abstracts in PubMed (3077 abstracts), PsycINFO (2860), Embase (3811), and the Cochrane Central Register of Controlled Trials (2885) were examined. These abstracts were identified by combining terms indicative of psychological treatment and depression (both MeSH terms and text words). For this database, the primary studies from 42 meta-analyses of psychological treatment for depression were also checked to ensure that no published studies had been missed.[10] For our study, the full texts of these 1237 papers were examined. The reference lists of earlier reviews of CBT were also examined, as well as the references of the included primary studies.

We included RCTs in which the effects of CBT were compared with the effects of a control group (wait-list, CAU, placebo, or other) or another type of treatment (psychotherapy or pharmacotherapy) in adults and where the authors declared that the primary clinical problem treated was depression, assessed either by diagnostic interview or self-report questionnaire. We also included studies that compared pharmacotherapy with the combination of CBT and pharmacotherapy.

CBT was defined as a therapy in which the therapist focuses on the impact that a patient's present dysfunctional thoughts affect current behaviour and functioning.[11] CBT helps clients to evaluate, challenge, and modify their dysfunctional beliefs (cognitive restructuring), in part to promote behavioural change and improve their functioning. Therapists use a psychoeducational approach, and teach patients new ways to cope with stressful situations; however, CBT therapists emphasize homework assignments and outside-of-session activities, through the method of collaborative empiricism, to directly experience the value of proposed changes within therapy sessions. We distinguished 2 main types of CBT:

1. CBT in which cognitive restructuring is the core element of the treatment.
2. CBT in which cognitive restructuring is an important component, but in which at least 2 other components (such as BA, social skills training, relaxation, or coping skills) also have a prominent place. One example of this latter approach is the Coping with Depression course.[12]

Within the first subtype, we distinguished 2 variants:

a. The manual developed by Beck et al[1] is the most widely used manual for CBT (which includes a module on BA; see below).
b. In several studies, cognitive restructuring is used as a treatment (with or without a module on BA), but no explicit reference is made to Beck et al's manual, or where major adaptations were made to this manual.[13]

Therapies that could be considered to be part of a broader family of CBT, such as PST, BA, or social skills training, were not considered to be CBT if they did not include a module specifically focused on cognitive restructuring.

We excluded studies on children and adolescents below 18 years of age, studies on inpatients, and studies that included patients who were not depressed (for example, studies that also included participants who only met criteria for anxiety disorders in the sample). Comorbid general medical or psychiatric disorders were not used as an exclusion criterion. No language restrictions were applied.

Quality Assessment and Data Extraction

The validity of included studies was assessed with 4 criteria of the risk of bias assessment tool, developed by the Cochrane Collaboration to assess possible sources of bias in RCTs[14]:

1. Adequate generation of allocation sequence.
2. Concealment of allocation to conditions.
3. Prevention of knowledge of the allocated intervention to assessors of outcome.
4. Dealing with incomplete outcome data.

Data extraction was conducted by 2 independent researchers.

We coded several aspects of the included studies, including participant characteristics (recruitment method, definition of depression, and target group), intervention characteristics (format, number of sessions, and type of psychotherapy with which CBT was compared), and study characteristics (type of control group, type of medication, and intention-to-treat analyses).

Meta-Analyses

For each comparison between a CBT and a comparison group, the ES indicating the difference between the 2 groups at posttest was calculated (Cohen *d* or standardized mean difference). ESs were calculated by subtracting (at posttest) the average score of the CBT group from the average score of the comparison group, and dividing the result by the pooled standard deviations of the 2 groups. ESs of 0.8 can be assumed to be large, while ESs of 0.5 are moderate, and ESs of 0.2 are small.[15] Because several studies had small sample sizes, we adjusted for small sample bias as suggested by Hedges and Olkin (Hedges *g*).[16]

In the calculations of ESs, we only used instruments that explicitly measured symptoms of depression, such as the BDI-I or -II[17,18] or the HRSD.[19] If more than one depression measure was used, the mean of the ESs was calculated, thus each study provided only one effect. If means and standard deviations were not reported, we used the procedures of the CMA software, version 2.2.021 (Biostat, Englewood, NJ; 2013) to calculate the ES using dichotomous outcomes. If the ES could not be calculated with CMA, the study was excluded.

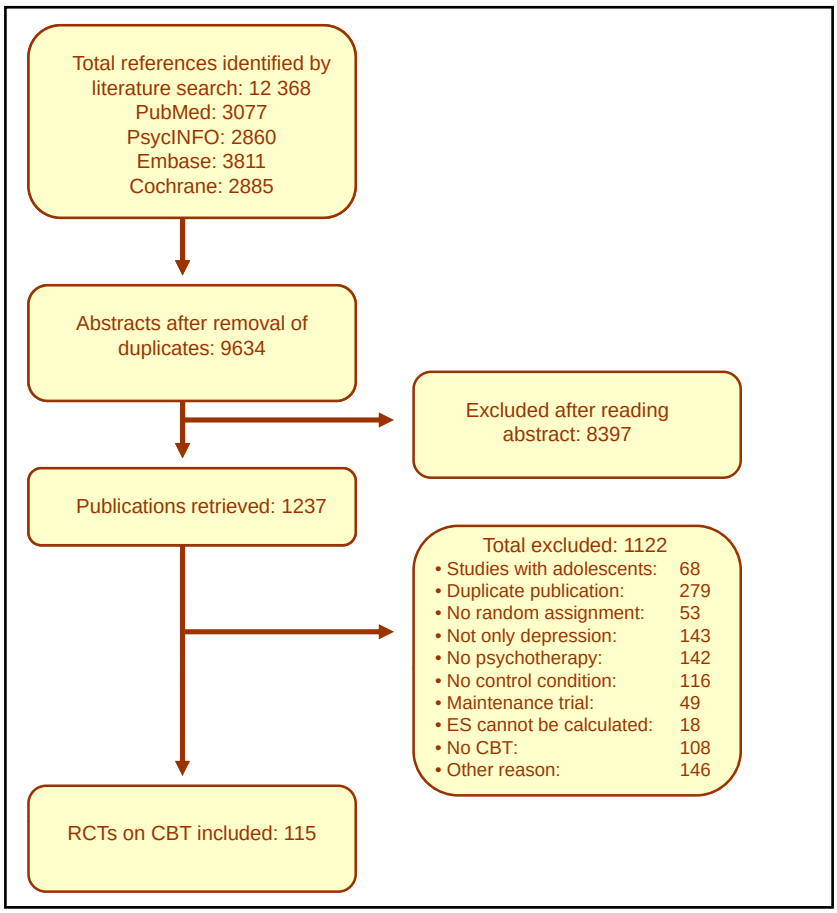
Pooled mean ESs were calculated with CMA. As we expected considerable heterogeneity among the studies, we used the random effects model.

The standardized mean difference (Hedges *g*) is not easy to interpret from a clinical perspective. Therefore, we also transformed the standardized mean differences into the NNT, using the formulae provided by Kraemer and Kupfer.[20] The NNT indicates the number of patients that have to be treated to generate one additional positive outcome.[21]

As an indicator of heterogeneity, we calculated the I^2-statistic, which gives heterogeneity in percentages. A value of 0% indicates no observed heterogeneity, and larger values show increasing heterogeneity, with 25% as low, 50% as moderate, and 75% as high heterogeneity.[22] We also calculated the *Q*-statistic, but only report whether this was significant or not.

Subgroup analyses were conducted according to the mixed effect model. In this model, studies within subgroups are pooled with the random effects model, while tests for significant differences between subgroups are conducted with the fixed effects model. For continuous variables, we used meta-regression analyses to test whether there was a significant relation between the continuous variable and the ES. Publication bias was tested by inspecting the

Figure 1 Flowchart of inclusion of studies



funnel plot on primary outcome measures and by the trim and fill procedure, which yields an estimate of the ES after the publication bias has been taken into account (as implemented in CMA, version 2.2.021). We also conducted Egger's test of the intercept to quantify the bias captured by the funnel plot and test whether it was significant.

Results

Selection and Inclusion of Studies

Having examined a total of 12 368 abstracts (9634 after removal of duplicates), we retrieved 1237 full-text papers for further consideration. We excluded 1122 of the retrieved papers. Figure 1 presents a flowchart describing the inclusion process and describes the reason why studies were excluded. This process resulted in a total of 115 studies that met our inclusion criteria and were included in this meta-analysis.

Characteristics of Included Studies

An overview of the characteristics of the set of included studies is presented in Table 1. Selected characteristics of each of the 115 included studies are reported online in eAppendix 1, and the references are presented in eAppendix 2. Most studies recruited patients from the community, and were aimed at adults with major depressive disorder as the primary presenting problem. CBT was delivered according to the manual from Beck et al[1] in most studies, and almost two-thirds of the CBT interventions had between 8 and 16 sessions. Most of the studies were conducted in the United States. The quality of the included studies was not optimal. Only 43 studies met at least 3 of the 4 quality criteria.

CBT, Compared With Control Condition

The effects of CBT were compared with a control group in 75 studies, with 94 comparisons (Table 2). The mean ES was a *g* of 0.71 (95% CI 0.62 to 0.79), which corresponds with a NNT of 2.60. Heterogeneity was moderate (I^2 = 56.66%), and highly significant.

Fourteen studies were included in which 2 or more CBT treatments were compared with the same control group. This means that multiple comparisons from this study were not independent of each other, but their use in the same analyses may have resulted in an artificial reduction of heterogeneity and therefore affected the pooled ES. We examined these possible effects by conducting sensitivity analyses in which we included only 1 ES per study. First, we included only the comparison with the largest ES from that study and then we conducted another analysis in which we included only the smallest ES. The resulting ESs (Table 2) were comparable with the ones found in the overall analyses. Heterogeneity remained moderate to high and highly significant in these analyses.

Table 1 Selected characteristics of studies of CBT for adult depression (*n* = 115)

Characteristic	*n*	%
Recruitment		
Community	63	54.8
Clinical samples	28	24.3
Other methods	24	20.9
Diagnosis		
Major depressive disorder	50	43.5
Diagnosed mood disorder	29	25.2
Self-report and (or) other	36	31.3
Target group		
Adults in general	64	55.7
Older adults	15	13.0
Student populations	6	5.2
Women with PPD	8	7.0
General medical patients	13	11.3
Other	9	7.8
CBT type		
Beck	41	35.7
Other cognitive restructuring	34	29.6
Other form of CBT	40	34.8
Number of sessions		
<8	20	17.4
8–16	75	65.2
>16	20	17.4
Control group		
Wait-list	37	32.2
CAU	26	22.6
Other control group	14	12.2
No controlled study	38	33.0
Country		
United States	55	47.8
United Kingdom	16	13.9
Europe	17	14.8
Canada	10	8.7
Australia	6	5.2
Other	11	9.6
Quality		
Sequence generation	44	38.3
Allocation concealment	41	35.7
Blinding of assessors	89	77.4
Intention-to-treat analyses	63	54.8
≥3 criteria	43	37.4
Comparisons		
CBT, compared with control	75	65.2
PHA, compared with CBT + PHA	11	9.6
CBT, compared with PHA	20	17.4
CBT, compared with other therapies	46	40.0

PHA = pharmacotherapy; PPD = postpartum depression

We also calculated the ESs based exclusively on the HRSD and found somewhat higher results (g = 0.90; 95% CI 0.71 to 1.08; I^2 = 68.82; NNT= 2.10). The ES exclusively based on the BDI was comparable with the overall ES (g = 0.79; 95% CI 0.66 to 0.92; I^2 = 62.26; NNT = 2.36), as was the ES based on the BDI-II (g = 0.72; 95% CI 0.42 to 1.01; I^2 = 73.41; NNT = 2.56).

Inspection of the funnel plot and the Duval–Tweedie trim and fill procedure indicated considerable publication bias. After adjustment for missing studies (n = 27), the ES dropped from a g of 0.71 to a g of 0.53 (95% CI 0.43 to 0.62). The Egger test also pointed at an asymmetric funnel plot (intercept 1.61; 95% CI 1.11 to 2.10; $P < 0.001$).

We conducted a series of univariate subgroup analyses to examine the association between the ES and characteristics of the studies (Table 2). In these analyses, we found indications that CBT according to Beck's procedures was significantly more effective than other CBT treatments, that recruitment from community samples resulted in a higher ES, that the ESs differed across the various target groups, that type of control group was significantly associated with the ES, that high-quality studies had lower ESs than low-quality studies, and that the ESs differed across various countries. We found no indication that ESs differed according to definition of depression (diagnostic interview, compared with self-report), and according to treatment format (individual, group, and guided self-help). Heterogeneity was moderate and significant in most subgroups.

To further explore differences between subgroups of studies, we also conducted a multivariate meta-regression analysis (Table 3). We found that the ES was smaller in clinical samples, in adults, compared with more specific target groups, in high-quality studies, in studies conducted in the United States, compared with other countries, and in placebo and (or) other control groups. In contrast to the univariate analyses, we found no indication that CBT according to Beck's procedures was significantly more effective than other CBT treatments.

Because we found that the quality of the study was significantly associated with the ES, both in the univariate and the multivariate meta-regression analysis, we conducted an additional univariate meta-regression analysis with the number of quality criteria that were met in the study as predictor. The resulting slope was –0.14 (95% CI –0.18 to –0.10; $P < 0.001$), indicating that the average ES was lowered by 0.14, with each of the 4 quality criterion that was not met.

Pharmacotherapy, Compared With the Combination of Pharmacotherapy and CBT

We were able compare the effects of CBT plus pharmacotherapy with pharmacotherapy alone in 11 studies (Table 4). The mean ES was a g of 0.49 (95% CI 0.29 to 0.69), with low and nonsignificant heterogeneity (I^2 = 16.48). The corresponding NNT was 3.68. ESs resulting from the HRSD and the BDI were comparable.

Table 2 Effects of CBT, compared with control conditions, at posttest[a]

Variable		n_{comp}	*g*	95% CI	*z*	I^{2b}	NNT	*P*[c]
CBT, compared with control								
All comparisons		94	0.71	0.62 to 0.79	16.10[d]	56.66[d]	2.60	
One ES per study (only highest)		75	0.70	0.61 to 0.80	14.37[d]	61.82[d]	2.63	
One ES per study (only lowest)		75	0.64	0.55 to 0.74	13.97[d]	57.40[d]	2.86	
Only HRSD		32	0.90	0.71 to 1.08	9.47[d]	68.82[d]	2.10	
Only BDI		57	0.79	0.66 to 0.92	11.63[d]	62.26[d]	2.36	
Only BDI-II		13	0.72	0.42 to 1.01	4.78[d]	73.41[d]	2.56	
13 outliers excluded[e]		81	0.71	0.64 to 0.79	19.19[f]	22.18[f]	2.60	
After adjustment for publication bias		94	0.53	0.43 to 0.62			3.42	
Subgroup analyses[g]								
CBT type	Beck	21	0.92	0.71 to 1.14	8.29[d]	57.37[h]	2.07	0.04
	Other cognitive restructuring	28	0.73	0.59 to 0.88	10.02[d]	50.67[h]	2.54	
	Other CBT	45	0.61	0.49 to 0.73	10.00[d]	55.57[d]	2.99	
Recruitment	Community	58	0.81	0.69 to 0.93	13.56[d]	50.47[d]	2.30	0.008
	Clinical samples	17	0.51	0.36 to 0.67	6.63[d]	32.21 ns	3.55	
	Other	19	0.62	0.43 to 0.80	6.66[d]	70.93[d]	2.96	
Diagnosis	Formal diagnosis	56	0.70	0.59 to 0.82	12.13[d]	61.60[d]	2.63	0.91
	Self-report	38	0.71	0.58 to 0.84	10.49[d]	48.11[h]	2.60	
Target group	Adults	52	0.70	0.59 to 0.81	12.03[d]	50.65[d]	2.63	0.02
	Older adults	11	0.54	0.32 to 0.76	4.86[d]	54.46[f]	3.36	
	Student population	7	1.23	0.78 to 1.68	5.34[d]	51.53 ns	1.62	
	Women with PPD	7	0.59	0.47 to 0.71	9.71[d]	0 ns	3.09	
	General medical	9	0.88	0.67 to 1.10	8.07[d]	16.63 ns	2.15	
	Other	8	0.71	0.29 to 1.14	3.28[h]	80.98[d]	2.60	
Format	Individual	46	0.71	0.57 to 0.86	9.60[d]	61.87[d]	2.60	0.80
	Group	27	0.71	0.58 to 0.83	10.73[d]	46.98[h]	2.60	
	Guided self-help	20	0.77	0.62 to 0.92	9.92[d]	31.30 ns	2.42	
Control group	Wait-list	55	0.83	0.72 to 0.94	15.17[d]	36.68[h]	2.26	0.003
	CAU	26	0.59	0.42 to 0.76	6.93[d]	66.46[d]	3.09	
	Placebo and (or) other	13	0.51	0.32 to 0.69	5.48[d]	53.22[f]	3.55	
Quality	High (≥3 criteria)	39	0.53	0.43 to 0.63	10.66[d]	55.60[d]	3.42	<0.001
	Low (≤2 criteria)	55	0.90	0.77 to 1.03	13.48[d]	93.20[h]	2.10	
Country	United States	43	0.90	0.74 to 1.05	11.25[d]	52.57[d]	2.10	<0.001
	United Kingdom	14	0.41	0.26 to 0.57	5.25[d]	32.10 ns	4.39	
	European Union	14	0.52	0.37 to 0.66	7.07[d]	38.48 ns	3.50	
	Canada	4	0.99	0.29 to 1.68	2.79[h]	55.69 ns	1.94	
	Australia	8	0.67	0.32 to 1.01	3.80[d]	69.05[h]	2.75	
	Other	11	0.78	0.59 to 0.97	7.98[d]	53.33[f]	2.39	

[a] All results are reported with Hedges *g*, according to the random effects model.
[b] The *P* levels in this column indicate whether the *Q*-statistic is significant (the I^2 statistic does not include a test of significance).
[c] The *P* levels in this column indicate whether the difference between the ESs in the subgroups is significant.
[d] $P < 0.001$
[e] Outliers were defined as studies in which the 95% CI was outside the 95% CI of the pooled studies. (Below the 95% CI, see online eAppendix 1: Baker, 2010; Dowrick, 2000; Elkin 1989; Lamers, 2010; Miranda, 2003; Serfaty, 2009; Smit, 2006; Spek, 2007. Above the 95% CI, see online eAppendix 1: Faramarzi, 2008; Jamison, 1995; Pecheur, 1984; Rohan, 2007; Taylor, 2009.)
[f] $P < 0.05$
[g] Subgroup analyses were conducted according to the mixed effects model.
[h] $P < 0.01$
n_{comp} = number of comparisons; ns = not statistically significant ($P > 0.05$); PPD = postpartum depression

Table 3 Standardized regression coefficients of characteristics of studies on CBT in relation to the ES: multivariate meta-regression analyses

Variable		b	SE	*P*
CBT type	Beck			
	Other cognitive restructuring	–0.49	0.13	
	Other CBT	–0.18	0.13	
Recruitment	Clinical samples, compared with other	–0.23	0.10	<0.05
Diagnosis	Formal diagnosis, compared with self-report	0.17	0.10	
Target group	Adults, compared with specific group	–0.17	0.08	<0.05
Number of sessions	Continuous	0.00	0.01	
Format	Individual			
	Group	0.09	0.09	
	Guided self-help	0.20	0.14	
Quality	High, compared with low	–0.21	0.09	<0.05
Control group	Wait-list			
	CAU	–0.10	0.11	
	Placebo and (or) other	–0.27	0.11	<0.05
Country	United States, compared with other	0.21	0.09	<0.05
Constant		0.89	0.19	<0.001

Because of the small number of comparisons, we conducted only a limited number of subgroup analyses (subgroups with less than 3 comparisons). There was no indication that the ES was associated with type of CBT, the quality of the study, or the type of medication (Table 4).

CBT, Compared With Pharmacotherapy

CBT was compared with pharmacotherapy in 20 studies (Table 4). The resulting ES was a g of 0.03 (95% CI –0.13 to 0.18, $P > 0.05$), indicating no significant overall difference in outcome between these 2 types of treatment. Heterogeneity was moderate but significant ($I^2 = 54.56$, $P < 0.01$). The NNT was 62.50. Comparable ESs were found when limited to the HRSD and the BDI. Subgroup analyses (with more than 3 comparisons in each subgroup) did not point at any significant difference, and heterogeneity was moderate in most subgroups.

CBT, Compared With Other Psychotherapies

CBT could be compared directly with other psychotherapies in 46 studies (Table 4). ESs ranged from –0.02 to 0.25, and provided little indication that CBT was significantly more effective than nondirective supportive therapy, BA therapy, psychodynamic psychotherapy, IPT, PST, and other psychotherapies. The only ES that approached a moderate effect was the specific comparison between CBT and psychodynamic psychotherapy, but that result was based on only 5 studies, and with a broad confidence interval (–0.07 to 0.58).

When we selected only the studies in which Beck's manual was specifically used, we also found little indication that CBT was more effective than other psychotherapies (Table 4). However, there were 2 comparisons, between CBT and supportive therapy ($g = 0.26$), and CBT and psychodynamic psychotherapy ($g = 0.27$), that clearly warrant further examination, as the number of studies was small and the pattern of results suggests a possible superiority of CBT with more research.

Discussion

Based on a large number of comparisons of CBT with a control or alternate intervention group, tour meta-analysis found that CBT is an efficacious treatment for adult depression.[5,6,23,24] The comparison of CBT and control conditions yielded a large ES in favour of CBT ($g = 0.71$). However, this ES is an overestimation of the true ES, because we also found clear indications for publication bias. Further, the inclusion of a considerable number of lower-quality studies has probably also led to an overestimation of the mean ES.

Our meta-analysis was the first to provide separate comparisons of CBT with wait-list, CAU, and placebo and (or) other control groups. These comparisons showed superiority of CBT to all control groups. However, the ES was significantly smaller in studies that compared CBT with placebo and (or) other control groups relative to studies that compared CBT with wait-list or CAU control groups, which is in line with earlier research.[25]

Subgroup analyses also showed differences in ESs across various countries. In particular, studies conducted in the United States produced larger ESs than studies conducted elsewhere. Within the current CBT and control group comparisons, ESs were also smaller for studies that used clinical samples, and for adults, compared with more specific target groups, including, for example, older adults, women with postpartum depression, and patients with general medical conditions. However, other evidence suggests that psychotherapy for depression is equally

Table 4 Effects of CBT at posttest, compared with pharmacotherapy alone or in combination, CBT, compared with pharmacotherapy, and CBT, compared with other psychotherapies, for adult depression[a]

Variable		n_{comp}	*g*	95% CI	*z*	I^{2b}	NNT	*P*[c]
Pharmacotherapy, compared with combined								
All comparisons		11	0.49	0.29 to 0.69	4.75[d]	16.48 ns	3.68	
BDI only		7	0.47	0.22 to 0.73	3.63[d]	26.36 ns	3.85	
HRSD only		7	0.34	0.07 to 0.61	2.46[e]	35.16 ns	5.26	
Subgroup analyses								
CBT type	Beck	5	0.47	0.17 to 0.78	3.04[f]	8.21 ns	3.85	0.91
	Other	6	0.50	0.20 to 0.79	3.29[f]	33.96 ns	3.62	
Quality	High (≥3 criteria)	4	0.34	–0.11 to 0.79	1.49 ns	30.92 ns	5.26	0.42
	Low (≤2 criteria)	7	0.55	0.33 to 0.77	4.94[d]	5.95 ns	3.31	
Medication	TCA	6	0.46	0.22 to 0.69	3.83[d]	0 ns	3.91	0.84
	SSRI	3	0.45	–0.06 to 0.96	1.74 ns	54.50 ns	4	
	Other	2	0.89	–0.50 to 2.28	1.25 ns	64.61 ns	2.13	
CBT, compared with pharmacotherapy								
All studies		20	0.03	–0.13 to 0.18	0.33 ns	54.56[f]	62.5	
2 outliers excluded		18	–0.05	–0.17 to 0.07	–0.81 ns	23.70 ns	35.71	
BDI only		12	0.13	–0.13 to 0.38	0.96 ns	68.08[d]	13.51	
HRSD only		15	0.06	–0.10 to 0.21	0.74 ns	42.98[e]	29.41	
Subgroup analyses								
CBT type	Beck	13	0	–0.15 to 0.15	–0.03 ns	20.49 ns	∞	0.70
	Other	7	0.07	–0.25 to 0.39	0.40 ns	77.49[d]	25	
Recruitment	Community	7	–0.08	–0.25 to 0.09	–0.92 ns	0 ns	21.74	0.49
	Clinical samples	9	0.04	–0.18 to 0.26	0.36 ns	47.80 ns	45.45	
	Other	4	0.21	–0.35 to 0.76	0.74 ns	83.51[d]	8.47	
Target group	Adults	16	–0.06	–0.19 to 0.08	–0.82 ns	25.19 ns	29.41	0.14
	Other	4	0.32	–0.16 to 0.80	1.30 ns	82.62[f]	5.56	
Quality	High (≥3 criteria)	7	–0.11	–0.26 to 0.04	–1.44 ns	0 ns	16.13	0.14
	Low (≤2 criteria)	13	0.1	–0.13 to 0.32	0.84 ns	63.47[f]	17.86	
Medication	TCA	7	0.15	–0.11 to 0.40	1.11 ns	42.73 ns	11.9	0.15
	SSRI	7	0.05	–0.27 to 0.37	0.31 ns	73.43[f]	35.71	
	Other	6	–0.14	–0.31 to 0.03	–1.65 ns	0 ns	12.82	
Country	United States	12	0.02	–0.16 to 0.20	0.21 ns	48.63[e]	83.33	0.93
	Other	8	0.04	–0.25 to 0.32	0.25 ns	65.66[f]	45.45	
CBT, compared with other psychotherapies								
Supportive therapy		16	0.1	–0.06 to 0.25	1.22 ns	26.75 ns	17.86	
BA		8	–0.02	–0.25 to 0.21	–0.17 ns	0 ns	83.33	
Psychodynamic psychotherapy		5	0.25	–0.07 to 0.58	1.52 ns	16.39 ns	7.14	
IPT		5	–0.09	–0.39 to 0.20	–0.61 ns	41.53 ns	20	
PST		3	–0.13	–0.39 to 0.13	–0.99 ns	0 ns	13.51	
Other psychotherapies		9	–0.09	–0.29 to 0.12	–0.85 ns	0 ns	20	

continued

Table 4 continued

Variable	n_{comp}	*g*	95% CI	*z*	I^{2b}	NNT	P^c
CBT (Beck), compared with other psychotherapies							
Supportive therapy	3	0.26	–0.28 to 0.79	0.95 ns	48.91 ns	6.85	
BA	6	–0.09	–0.32 to 0.16	–0.69 ns	0	20.00	
Psychodynamic psychotherapy	2	0.27	–0.26 to 0.80	1.01 ns	0	6.58	
IPT	4	–0.21	–0.46 to 0.04	–1.67 ns	0	8.47	
Other psychotherapies	7	–0.15	–0.36 to 0.07	–1.36 ns	0	11.9	

[a] Effects are reported with Hedges *g*, according to the random effects model.

[b] The *P* levels in this column indicate whether the *Q*-statistic is significant (the I^2 statistic does not include a test of significance).

[c] The *P* levels in this column indicate whether the difference between the ESs in the subgroups is significant.

[d] $P < 0.001$; [e] $P < 0.05$; [f] $P < 0.01$

n_{comp} = number of comparisons; ns = not statistically significant ($P > 0.05$); SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant

effective in younger and older adults.[5,26] We have to remember with these subgroup analyses that they are only correlational associations and do not provide evidence for a causal relation. For example, it is very well possible that US studies used different methodologies than studies in other countries, and that these methodologies cause the difference in ESs.

Our current meta-analysis found that the combination of CBT and pharmacotherapy was superior to pharmacotherapy alone for the treatment of depression.[27] However, our meta-analysis found no difference in efficacy between CBT and pharmacotherapy in direct comparisons, which is inconsistent with early meta-analyses that found a superiority of CBT over antidepressants.[5,6] Further, Butler et al[23] pointed out that some of the early trials that compared CBT and medication had methodological characteristics that favoured CBT, and that earlier meta-analyses may have, therefore, overestimated the efficacy of CBT relative to pharmacotherapy. CBT may also be more efficacious than pharmacotherapy for long-term but not short-term outcomes, whereas our meta-analysis focused only on short-term outcomes. A meta-analysis of longer-term effects of CBT reported that people who received CBT for depression had lower relapse rates after 1- and 2-year follow-up intervals than people treated with pharmacotherapy.[28,29] This issue warrants further consideration, as the evidence base grows and further analyses become possible.

The number of studies included in our meta-analysis allowed comparisons of CBT with other psychotherapies, including nondirective supportive therapy, BA therapy, psychodynamic psychotherapy, IPT, PST, and other psychotherapies. These comparisons indicate that CBT was no more or less effective than these other psychotherapies. However, some of these comparisons were based on a very small number of studies. For example, there were only 3 studies in which CBT was compared with PST. Despite the somewhat limited database, these results converge with the conclusion made by Cuijpers et al[24] that differences in ESs between psychotherapies for the treatment of depression are small and unstable across meta-analyses.

As previous meta-analyses have focused on CT,[1] the specific effects of CT trials, compared with more generic CBT trials for depression, were examined. There was no indication that CT was more effective than other CBT treatments within comparisons that involved CBT, compared with pharmacotherapy, and CBT, compared with other psychotherapies. Collectively, the current results indicate that specific CT[1] is no more effective than other forms of CBT.

The current meta-analysis has several limitations and considerations. The methodological quality of many of the studies included in the meta-analysis was suboptimal. While 37% (43/115) of the studies met at least 3 of the 4 quality criteria,[13] more studies failed to meet these criteria. As higher-quality studies tended to generate lower ESs, the inclusion of lower-quality studies may have produced an inflated estimate of the efficacy of CBT for adult depression. Second, although the overall number of studies was relatively large, several of the subgroup contrasts were based on a small number of studies. The failure to find significant differences between subgroups of studies may have been due to low statistical power rather than a true equivalency across subgroups.

Our meta-analysis was limited to the examination of the short-term efficacy of CBT. It is important to determine the long-term efficacy of CBT, compared with control groups, pharmacotherapy, and other psychotherapies.[28,30] Unfortunately, follow-up data are difficult to interpret using meta-analysis, owing to variable follow-up intervals that confound ESs with duration of follow-up, and between-study differences in how the follow-up phase data are handled. Thus, while simple comparisons of proportions of relapse in groups of people who received CT, compared with pharmacotherapy, have found an advantage of CT,[6] and some research has found that CBT reduces the risk of relapse of depression,[28,31,32] evaluations of the long-term efficacy and relapse prevention effects of CBT for

depression are needed, particularly in comparison with other interventions.

Finally, although CBT was found in the current analysis to be generally efficacious for the treatment of adult depression, not all people will benefit from CBT, and some people may respond better to other interventions than CBT. A few potential moderator variables were identified in this meta-analysis, including target group and clinical, compared with community, recruitment of participants. However, meta-analyses cannot determine which treatment may be the most appropriate for any given person with depression. Future research will need to continue to investigate which of the individual, treatment, and study characteristics may influence the efficacy of CBT for depression.

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