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A Meta-Analysis of the Effectiveness of Cognitive-Behavioural Therapies for Late-Life Depression
Une méta-analyse de l'efficacité des thérapies cognitivo-comportementales dans le traitement de la dépression chez les personnes âgées

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ABSTRACT

A comprehensive meta-analysis was conducted using studies of cognitive-behavioural-therapy-based interventions (CBT-BIs) for late-life depression. Patient characteristics, CBT modality, and other study variables were analyzed using subgroup and metaregression analysis methods. Results showed the collective treatment effect of CBT-BIs for reducing late-life depression to be moderate (g = -0.63) with significant heterogeneity (I^2 = 66.12%). CBT-BIs were found to be no more effective immediately posttreatment than other psychological treatments, pharmacotherapy, or combination interventions. The data support the notion that CBT is more effective in the long term.

RÉSUMÉ

On a mené une méta-analyse approfondie d'après des interventions basées sur la thérapie cognitivo-comportementale (IB-TCC) conçues pour le traitement de la dépression à un âge avancé. On analysa les caractéristiques du patient, les modalités de la TCC et d'autres

variables de l'étude, en ayant recours à des méthodes d'analyse de sous-groupe et d'analyse de métarégression. Les résultats ont révélé que l'effet du traitement collectif des IB-TCC en vue d'atténuer la dépression en âge avancé était moyen (g = -0,63) et considérablement hétérogène (I^2 = 66,12 %). On a conclu que les IB-TCC ne se révélaient pas plus efficaces immédiatement après le traitement que les autres types de traitements psychologiques, pharmacothérapeutiques ou que les interventions combinées. Les données semblent indiquer que la TCC est plus efficace à long terme.

In 2015, there were 901 million people over the age of 60 years globally. This age demographic is projected to increase to 1.4 billion by 2030 and to 2.1 billion by 2050 (United Nations Department of Economic and Social Affairs, Population Division, 2015). In older adulthood, depression is common and can have detrimental consequences on quality of life and longevity. Prevalence rates for major depression in late life vary considerably depending on the region, setting, and age group. A meta-analysis of these prevalence rates among community-based elderly populations found pooled prevalence rates of 7.2% (range: 4.6–9.3%) for major depression and 17.1% (range: 4.5–37.4%) for clinically significant depressive symptoms (Luppa et al., 2012). Elderly people living in residential care settings have been found to have higher prevalence rates for major depression ranging from 14% to 42% (Djernes, 2006). In a different meta-analysis of prospective studies, elderly women were found to have an increased risk of depression compared to men (Cole & Dendukuri, 2003). Common risk factors for developing depressive symptoms and depressive disorders among older adults include cognitive and functional impairment, somatic illness, sleep disturbance, loss or lack of close social contacts, history of depression, low income, and older-old age (Cole & Dendukuri, 2003; Glaesmer, Riedel-Heller, Braehler, Spangenberg, & Luppa, 2011; Leadholm, Rothschild, Nielsen, Bech, & Ostergaard, 2014).

Depressive symptoms left untreated in the elderly can have severe consequences. Major depression is highly associated with suicide in this population (Yeates & Thompson, 2008). A New Zealand case-control study demonstrated that the elimination of mood disorders, particularly depression, would result in a 74% reduction in serious suicidal behaviour among older adults (Beautrais, 2002). However, the prognosis for depression recovery in late life is poor. In a secondary analysis of older adults with major depression from the PRISM-E study, 71% of the patients remained depressed at 6 months' follow-up after receiving services from mental health professionals in primary care and mental health specialty settings (Azar, Chopra, Cho, Coakley, & Rudolph, 2011). Because of this poor prognosis and the detrimental effects of depression in late life, researchers have examined the clinical utility of different psychological interventions (Mackin & Areán, 2005; Scogin, Welsh, Hanson, Stump, & Coates, 2005). Among the psychotherapies for treating depression in all age groups, cognitive-behavioural-therapy-based interventions (CBT-BIs) have been the most frequently investigated.

CBT-BIs are considered evidence-based, manualized psychological interventions for a variety of diagnoses, including depression. The modality specifically

referred to as CBT utilizes techniques that help identify and restructure maladaptive thought processes and learned behaviours. The treatment aims to achieve the restructuring of maladaptive cognitions in relation to environmental contingencies that play a role in maintaining those cognitions. There are several other intervention techniques that are based on the broad CBT theoretical model. One of those, behaviour therapy (BT), involves manipulating environmental cues and providing response-contingent positive reinforcement in order to develop behavioural skills, increase positive mood, and decrease maladaptive behaviours. Cognitive therapy (CT) identifies cognitive distortions that cause faulty information processing and modifies those thoughts in order to provide a more accurate and unbiased view of reality. Behavioural activation (BA) increases the frequency of engagement in personally identified pleasant events to improve mood. This modality helps patients to differentiate behavioural patterns that contribute to depressive and pleasant mood states. Problem-solving therapy (PST) helps develop a positive, constructive orientation toward approaching and resolving problems. It teaches patients problem identification and formulation, generating alternative solutions, goal-oriented decision-making, and solution implementation and verification. It also often involves increasing motivation and self-efficacy (Dobson, 2009; O'Donohue & Fisher, 2009).

Psychotherapeutic interventions for late-life depression have been widely studied. However, previous meta-analyses have included all types of psychological treatments for depression (Pinquart, Duberstein, & Lyness, 2007; Wilson, Mottram, & Vassilas, 2008) and did not differentiate among the types of CBT-BIs (Gould, Coulson, & Howard, 2012; Peng, Huang, Chen, & Lu, 2009). In previous meta-analyses, moderating variables such as participant, intervention, and study level characteristics were observed to contribute to between-study heterogeneity. For example, Pinquart et al. (2007) examined nine variables, and four were found to significantly moderate treatment effects: type of control condition, quality of study, type of depression, and comorbidity. Additionally, Gould et al. (2012) found that 6 out of 15 variables they studied contributed to between-study heterogeneity; these were concurrent pharmacotherapy, mode of therapy, type of control group, type of outcome measure, and study quality-related factors (allocation concealment and selective outcome reporting).

The current meta-analysis focuses exclusively on CBT-BIs and explores the moderating effects that have been found to play a role in treatment. Specifically, we hypothesized that CBT-BIs would have larger treatment effects in reducing depression in older adults compared to both active and nonactive control conditions. We also examined the effectiveness of CBT-BIs compared to non-CBT psychotherapies and pharmacotherapy. Additionally, since each CBT-BI offers both shared and unique change components that drive the effect of the treatment, the current meta-analysis explores the magnitude of treatment effects among these interventions. Finally, we examined differences in treatment effect sizes at follow-up periods of 1–3 months, 6–9 months, and 10–12 months.

METHOD

Search Strategy

Two independent investigators (WJT and AOH) conducted a comprehensive search of the following 12 electronic databases: PsycINFO, PubMed, Web of Science, Dissertations & Theses, Cochrane Library: Cochrane Central Register of Controlled Trials (Clinical Trials), Academic Search Complete, E-Journals, CINAHL Plus, Abstracts in Social Gerontology, OCLC Proceedings, ArticleFirst, and PaperFirst. To decrease the possibility of search method bias, the two independent investigators performed searches of each database using their own search terms relevant to the study topic. For example, in PsycINFO, the search included the following key words and descriptors: cognitive-behavioral therapy, behavior therapy, geriatrics psychotherapy, behavioral activation, problem-solving therapy, elderly, late life, geriatric, senior, affective disorders, dysthymic disorder, major depression, or recurrent depression.

The final search was conducted in January 2015. Also, journal-specific electronic searches were conducted, and the reference lists of systematic reviews and primary studies on psychological interventions for the treatment of depression in older adults were reviewed to find additional studies. Finally, published research experts in the subject areas of gerontology and psychological treatment for depression were contacted via email and websites for possible relevant unpublished and ongoing studies. Two unpublished dissertation studies (Norton, 2010; Shah, 2010) were obtained for review, and determined to be eligible for inclusion.

Inclusion Criteria

This meta-analysis included studies of participants described as older adults with a lower age limit of 55 years (i.e., studies with any participants below the age of 55 were rejected) and a mean age greater than or equal to 60. The articles had to have participants with a primary diagnosis of depression, as determined by use of a diagnostic clinical interview and/or by meeting a level of depression severity above the cut-off scores on self-rated or clinician-rated depression scales. Primary studies must have had participants enrolled in a CBT-BI for depression. In addition, studies were required to include a control condition or treatment comparison condition. The presence of comorbid disorders was allowed if depression was the primary mental health disorder. Finally, studies had to provide sufficient information to calculate effect sizes (e.g., sample size, means, standard deviations, standard errors, event rates, and change scores).

Quality of Studies

The quality of studies was evaluated using a modified Randomized Control Trial of Psychotherapy Quality Rating Scale (RCT-PQRS; Kocsis et al., 2010). The modified RCT-PQRS consisted of 24 items scored from 0 to 2 for a maximum study quality score of 48. Because nonrandomized studies were included in the current meta-analysis, it was important to distinguish their scores from randomized studies on a scale that was designed primarily for randomized control trials (Higgins

et al., 2013). In pursuit of a replicable and easily reversible method for weighing nonrandomized studies lower than randomized ones, the two primary investigators (WJT and AOH) achieved consensus on multiplying nonrandomized studies by a coefficient of 0.75 to reduce their quality score by one fourth. This procedure was chosen because it was easy to replicate and, if necessary, reverse. Although the 0.75 coefficient was arbitrary, it resulted in an easily recognizable difference (one fourth) that distinguished between the two types of studies. The final scores on the modified RCT-PQRS were examined across raters using a two-way random effects intraclass correlation coefficient (ICC), and the results evidenced a reliability of .83. This level of interrater reliability is consistent with previous findings using the RCT-PQRS (Gerber et al., 2011; Kocsis et al., 2010; Thoma et al., 2012).

Data Analysis

This meta-analysis utilized the random-effects model to account for between-study variance in heterogeneity estimates and sample size differences (Borenstein, Hedges, Higgins, & Rothstein, 2009; Cleophas & Zwinderman, 2008). The standardized mean difference (SMD) was calculated on depression outcome measures for each study using Cohen's *d* effect size. Odds ratios were used to calculate effect size estimates for categorical data (Fleiss & Berlin, 2009). Hedges' *g* correction for small sample bias was employed to prevent overestimating treatment effects from studies with small samples (Hedges, 1981; Hedges & Olkin, 1985). Effect size data was calculated using the meta-analysis software package Comprehensive Meta-Analysis version 2 (CMA-2). For studies that included multiple depression outcome measures, the average of the effect sizes was calculated to create a single combined effect size. For interpretation of effect size estimates, Cohen (1988) suggested that effect size estimates around 0.2 corresponds to a small effect size, 0.5 to a medium effect size, and 0.8 and above to a large effect size. Effect size estimates in the negative (-) direction indicated that CBT-BIs reduced depression more than control or non-CBT-BI conditions.

Because it is difficult to interpret effect sizes calculated from continuous outcomes, the numbers-needed-to-treat (NNT) was calculated for each effect size estimate (da Costa et al., 2012). The NNT is defined as the number of participants that must be treated with the experimental intervention in order to create one good outcome or to prevent one bad outcome in comparison with the control condition (Furukawa, 1999). To calculate the NNT, this meta-analysis used the SMD from the continuous outcomes conversion formula provided by Furukawa (Furukawa, 1999; Furukawa, Cipriani, Barbui, Brambilla, & Watanabe, 2005; Furukawa & Leucht, 2011).

The presence of significant heterogeneity was assessed using Cochran's *Q* statistic (Cochran, 1954). This meta-analysis used an additional measure of heterogeneity that describes the amount of inconsistency in effect size estimates across the included studies, known as the I^2 statistic (Higgins, Thompson, Deeks, & Altman, 2003). Values of the I^2 statistic around 25%, 50%, and 75% are categorized as low, moderate, and high heterogeneity, respectively (Higgins et al., 2003).

The fail-safe *N* procedure outlined by Orwin (1983) was performed to address the occurrence of reduced reporting and publication of nonsignificant findings in treatment studies, commonly known as the "file-drawer problem" (Rosenthal, 1991; Rosenthal & Rubin, 1988). In addition, a funnel plot was utilized to examine the presence of publication bias.

Sensitivity and Moderator Analyses

Sensitivity analyses were used to examine (a) effects of the violation of the assumption of independence by using one effect size per study (highest and lowest); (b) depression outcome effect sizes derived from only dichotomous outcome data (e.g., remission or improvement); and (c) the three most utilized depression outcome measures found among the included studies, which were the Geriatric Depression Scale (GDS; Yesavage et al., 1983), Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), and Hamilton Depression Rating Scale (HDRS; Hamilton, 1960).

Subgroup and metaregression moderator analyses were conducted to determine if participant, intervention, or study level characteristics were significantly associated with effect size variability. Subgroup analyses at the level of participant characteristics were as follows: (a) depression diagnosis (MDD, minor/dysthymia/subthreshold, mixed depression), (b) mean age category (young-old 60–69, middle-old 70–79, old-old 80+), (c) comorbidity (cognitive, physical, psychological, multiple conditions, none), (d) concurrent pharmacotherapy (yes or no), and (e) recruitment setting (clinical, community, both). Intervention-level moderators included (a) CBT-BI type (CBT, CT, BT, BA, PST), (b) diagnostic measure (clinician-rated, participant self-rated, both), (c) treatment setting (inpatient or outpatient), (d) treatment format (individual, group, bibliotherapy/self-help), (e) number of intervention sessions (4–13, 14–20, 24–54, self-help), (f) treatment length in weeks (2–13, 14–20, 24–36), and (g) number of weekly intervention sessions (1 session, 2 sessions, 4 sessions, self-help). Additionally, study-level moderators included (a) control condition (active or nonactive), (b) study design (randomized control trial or nonrandomized control trial), and (c) type of analysis (intention-to-treat or completers-only). Univariate metaregression analyses were performed using an unrestricted maximum likelihood mixed-effects regression model (Borenstein et al., 2009). Quality of study, dropout percentage, gender (percentage of females), and study publication date (or date of dissertation) were examined as potential predictors of depression outcome effect sizes among the included studies.

RESULTS

Selected and Included Studies

The comprehensive search strategy by two independent investigators identified a combined total of 6,493 potentially relevant abstracts (Figure 1). After combining these records and removing duplicates, 4,458 abstracts were identified for further review. Two independent investigators, who did not take part in performing the

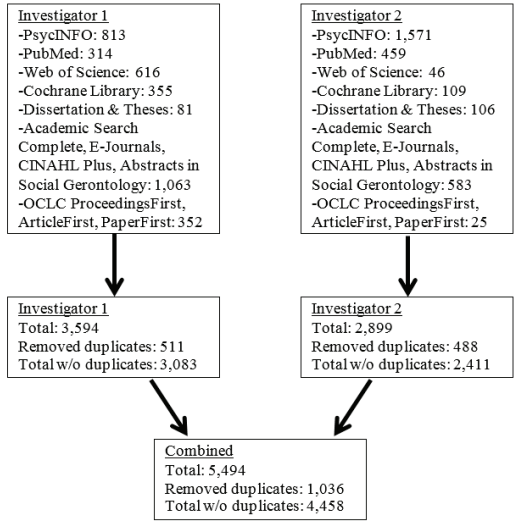

Figure 1. Flowchart of electronic search strategy.

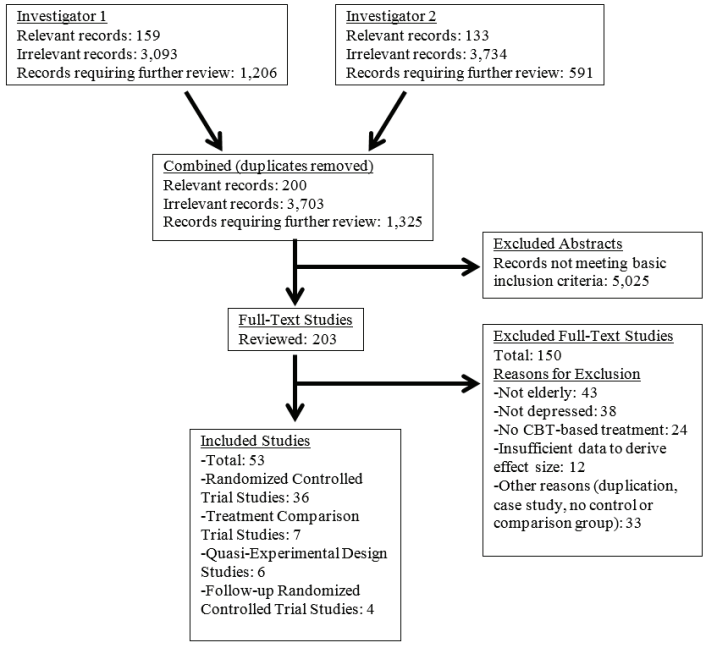

Figure 2. Flowchart of inclusion and exclusion of studies.

initial search, separately examined the 4,458 abstracts for study relevance and inclusion (Figure 2). After further screening, 203 full-text documents were retrieved for further full-text review. Fifty-three studies met all the inclusion criteria.

Characteristics of included studies. The 53 studies included in this meta-analysis had a combined sample size of 3,568 participants. Study publication dates ranged from 1982 to 2013. Mean quality of study score was 31 (*SD* = 6.14) with a range of 16–42 (see Figure 3). Of the participants within the included studies, 71% were women and 29% were men. Three studies did not report any data on the gender of participants (Abraham, Neundorfer, & Currie, 1992; Areán et al., 2010; Hsu et al., 2010). The sample-size-weighted mean age was 71 (*SD* = 5.49) with 62 being the youngest and 84 the oldest mean age reported in the studies.

Analyses were conducted on 1,604 participants in CBT-BIs, 1,456 in control conditions, 134 in other psychological treatments, 299 in pharmacotherapy, and 75 in combination treatment with CBT and pharmacotherapy. Among the included studies, 36 were randomized controlled trials and 6 were quasi-experimental with no randomization. These two types of studies were included in the main analysis resulting in a total of 42 studies (out of 53 total included studies). Of the remaining 11 studies, 7 were "treatment versus treatment" comparison trials without a control condition and 4 were randomized treatment and control trials at follow-up. These studies were analyzed separately. As some studies had more than one treatment condition, the 42 primary studies produced 52 effect size comparisons. Finally, 26 studies allocated participants to active control conditions and 19 studies used nonactive controls.

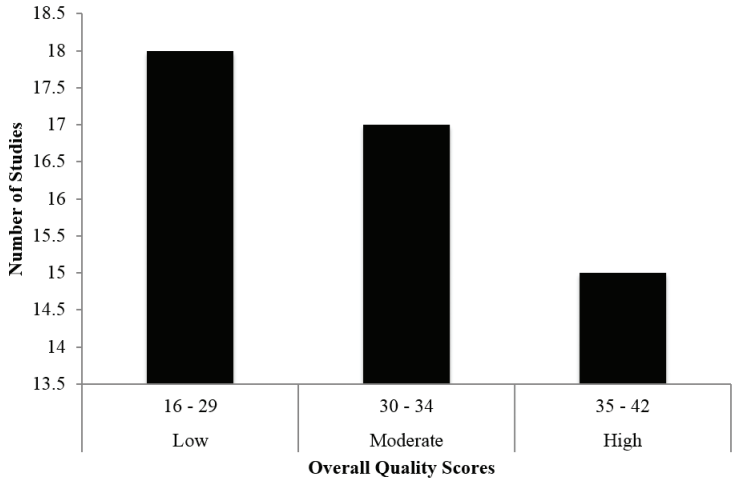

Figure 3. Histogram of total quality of study scores.

Table 1
Characteristics of Studies

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Abraham et al. (1992)	Clinical, Inpatient, Gender not reported	Moderate Depression. GDS ≥ 10	CBGT (19); FVIGT (15)	EC (A), (8)	34 (45)	84.4, 71–97, ≥70	No	Mix of multiple conditions	CO	Group (24 weeks)	BHS-20, GDS-30	Pre, post
Alexopoulos et al. (2003)	Clinical, Outpatient, 52%	MDD. HDRS ≥ 18, SCID	PST (12)	ST (A), (13)	3 (12)	74.1, 66–88, ≥65	No	Cognitive (executive dysfunction)	ITT	Individual (12)	HDRS-24	Pre, post
Areán et al. (1993)	Community, Outpatient, 74.67%	MDD. SADS/RDC, GDS ≥ 10, BDI ≥ 20, HDRS ≥ 18	PST (19); RT (28)	WLC (NA), (20)	16 (21.3)	66.5, ≥55	No	None reported	CO	Group (12)	BDI-21, GDS-30, HDRS-17, RDC	Pre, post, 3-month follow-up
Areán et al. (2005)	Community & Clinical, Outpatient, 64.18%	MDD/dyst. SCID	CBGT (13); CBGT + CCM (17)	CCM (A), (20)	17 (25.4)	65.3, 65–74, ≥60	No	None reported	CO	Group (18)	HDRS-21, SCID	Pre, post, 6-, 12-month follow-up
Areán et al. (2010)	Community & Clinical, Outpatient, Gender not reported	MDD. SCID, HDRS ≥ 20	PST (110)	ST (A), (111)	20 (9)	73, ≥60	No	Cognitive (executive dysfunction)	ITT	Individual (12)	HDRS-24	Pre, post
Beutler et al. (1987)	Clinical, Outpatient, 55.36%	MDD. DMS-III criteria, HDRS ≥ 18	CT (16); Alprazolam (12); CT + Alprazolam (13)	Placebo (A), (15)	46 (61.3)	70.7, ≥65	No	None reported	ITT	Group (20)	BDI-13, HDRS-21	Pre, post, 3-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Brand & Clingempeel (1992)	Clinical, Inpatient, 88.68%	MDD. RDC	BT + TAU (27)	TAU standard hospital care (A), (26)	3 (5.4)	71.7, ≥60	Yes	None reported	CO	Group (8)	BDI-21, HDRS-21, NOSIE-D-30	Pre, post
Brody et al. (2006)	Community, Outpatient, 65.63%	Maj./min./dyst. SCID, GDS-S ≥ 5	CBT SMT (12)	WLC (NA), (12); Taped EC (A), (8); WLC +Taped EC (20)	0	81.5, ≥60	Yes	Physical	CO	Group (6)	GDS-S-15	Pre, 6-month follow-up
Chu, Yoo, & Lee (2007)	Community, Outpatient, 80%	Minor Depression. GDS-S ≥ 5	CBT (21)	No Tx Control (NA), (19)	3 (7)	74.3, 68-78, ≥65	No	Mix of multiple conditions	CO	Group (12)	GDS-S-15	Pre, post
Ciechanowski et al. (2004)	Community & Clinical, Outpatient, 78.99%	Minor Depression or Dysthymia. SCID	PST (72)	UC (A), (66)	11 (8)	73, ≥60	Yes	Mix of multiple conditions	ITT	Individual (8)	HSCL-D-20	Pre, 6-, 12-month follow-up
Contreras et al. (2006)	Clinical, Outpatient, 92.20%	Maj./min./dyst. Diagnostic Interview	Brief CBT (19)	WLC (NA), (19)	0	63-77, ≥60	Yes	Psychological	CO	Individual (8)	GDS-30	Pre, post, 1-month follow-up
DeBerry et al. (1989)	Community, Outpatient, 56.25%	Minor Depression. BDI	CT (10); Meditation-Relaxation (13)	Pseudo-Tx (A), (9)	0	68.9, 65-75, ≥65	No	None reported	CO	Individual (20)	BDI-21	Pre, post

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Floyd (1999) Dissertation (published 2004) & Floyd et al. (2006) follow-up	Community, Outpatient, 76.09%	Maj./min./dyst. DSM-IV criteria, HDRS ≥ 10	CT (8); CBT Bibliotherapy (13)	Delayed Tx WLC (NA), (14)	14 (30)	68, 60-80, ≥60	Allowed if ≥ 3 months stabilized	None reported	CO	Bibliotherapy (4 weeks); Individual (16)	GDS-30, HDRS-21	Pre, post, 3-, 24-month follow-up
Gallagher & Thompson (1982)	Community & Clinical, Outpatient, 76.67%	MDD. SADS/RDC, BDI ≥ 17, HDRS ≥ 14	CT (10); BT (10); BPT (10)	None	8 (26.6)	67.7, 59-80, ≥55	No	None reported	CO	Individual (16)	BDI-21, HDRS-17, SDS-20	Pre, post, 1.3-, 3-, 6-, 12-month follow-up
Gallagher-Thompson & Steffen (1994)	Community & Clinical, Outpatient, 92%	Maj./min./dyst. SADS/RDC, BDI ≥ 10	CBT (31); BPT (21)	None	14 (21.2)	62	No	None reported	CO	Individual (20)	BDI-21, GDS-30, HDRS-17, RDC	Pre, post, 3-month follow-up
Gellis et al. (2007)	Clinical, Outpatient, 85%	MDD. CES-D ≥ 22	PST-HC (20)	UC (A), (20)	8 (16.6)	79.9, ≥65	Yes	Physical	CO	Individual (6)	BDI-21, GDS-S-15	Pre, post, 3-, 6-month follow-up
Gellis & Bruce (2010)	Clinical, Outpatient, 91.67%	Subthreshold. SCID, CES-D ≥ 22	PST-HC (18)	UC+E (A), (18)	2 (5.3)	75.9, ≥65	Yes	Physical	ITT	Individual (6)	BDI-21, HDRS-17	Pre, post

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Haringsma et al. (2006)	Community, Outpatient, 69%	Maj./min./dyst. M.I.N.I.-CR (Used MDD ES data only)	CBT (61) (MDD only N=21)	WLC (NA), (58) (MDD only N=22)	9 (7.6)	64.2, 55-85, ≥55	Yes	Physical	CO	Group (10)	CES-D-20, HADS-D-7	Pre, post, 2-, 14-month follow-up
Hautzinger & Welz (2004)	Community & Clinical, Outpatient, 79%	Maj./min./dyst. SCID	CBT (55)	WLC (NA), (30)	15 (15)	68.5, 60-87, ≥60	Yes	Mix of multiple conditions	CO	Group (12)	GDS-30, IDS-C-28, SCL-90-D, HR-Skala-20	Pre, post, 6-month follow-up
Hsu et al. (2010)	Community, Outpatient, Gender not reported	Minor Depression. Self-reported depressive symptoms	CBGT (10)	WLC (NA), (10)	0	75.3, ≥65	No	None reported	CO	Group (8)	CES-D-20	Pre, post
Joling et al. (2011)	Clinical, Outpatient, 73.53%	Subthreshold. MINI, CES-D ≥ 16	CBT Bibliotherapy (86)	UC (A), (84)	24 (14)	81.5, ≥75	Yes	Physical	ITT	Bibliotherapy (12 weeks)	CES-D-20	Pre, post
Kiosses et al. (2010)	Community, Outpatient, 70.83%	MDD. SCID, HDRS ≥ 17	PST-HD (15)	ST-HD (A), (15)	5 (16.7)	79.4, 66-94, ≥65	Allowed if ≥ 8 weeks stabilized	Cognitive	ITT	Individual (12)	HDRS-24	Pre, post
Kitsumban et al. (2009)	Community, Outpatient, 100%	Minor to moderate Depression. BDI ≥ 10, BDI ≤ 29	MBCT (27)	TAU (A), (27)	6 (10)	69.3, 60-80, ≥60	No	None reported	CO	Group (11)	BDI-21	Pre, post, 3-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Klausner et al. (1998)	Community & Clinical, Outpatient, 54.55%	MDD. SADS	GFGP (7); RT (6)	None	2 (13.3)	66.8, ≥55	Yes	Physical	CO	Group (11)	BDI-21, BHS-20, HDRS-17, MADRS-10	Pre, post
Konnert et al. (2009)	Clinical, Inpatient, 76.74%	Subsyndromal SCID-IV-R, GDS ≥ 9	CBGT (20)	TAU (A), (23)	21 (33)	81, ≥60	Yes	Physical	CO	Group (13)	CES-D-20, GDS-30	Pre, post, 3-, 6-month follow-up
Laidlaw et al. (2008)	Clinical, Outpatient, 72.50%	MDD. SADS, HDRS ≥ 7, HDRS < 24, BDI ≥ 13, BDI < 28	CBT (20)	TAU (A), (20)	4 (9)	74, ≥60	No CBT. Yes TAU.	Mix of multiple conditions	ITT	Individual (17)	DI-21, BHS-20, GDS-S-15, HDRS-17, RDC	Pre, post, 3-, 6-month follow-up
Lamers et al. (2010)	Clinical, Outpatient, 46.54%	Maj./min./dyst. MINI, HDRS < 18	CBT-based Minimal Psychological Intervention (127)	UC (A), (135)	97 (27)	70.7, ≥60	Yes	Physical	CO	Individual (10)	BDI-21	Pre, post, 3-, 9-month follow-up
Landreville & Bissonnette (1997)	Community & Clinical, Outpatient, 86.96%	Maj./min. GDS ≥ 11, IDD ≥ 22	Cognitive Bibliotherapy (10)	Delayed Tx WLC (NA), (13)	0	72, ≥55	Allowed if ≥ 3 months stabilized	Physical	CO	Bibliotherapy (4 weeks)	BDI-21, GDS-30, IDD-22	Pre, post, 6-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Latour & Cappeliez (1994)	Clinical, Outpatient, 82.76%	MDD. IDD, BDI ≥ 14, GDS ≥ 14	CT + Pretherapy Training (12); CT + Pretherapy Attention Placebo (9)	None	8 (27.6)	69, 65-79, ≥65	No	None reported	CO	Group (4 pretherapy sessions + 12 CT sessions)	BDI-21, GDS-30, HDRS-17	Pre, post
Lichtenberg et al. (1996)	Clinical, Inpatient, 83%	Maj./min. GDS ≥ 11, RDC	BT by psychologist (13); BT by occupational therapist (13)	No Tx Control (NA), (11)	4 (9.8)	78, ≥60	No	Physical	CO	Individual (4)	GDS-30	Pre, post
Lynch et al. (2003)	Clinical, Outpatient, 85.29%	MDD. DDES, BDI ≥ 19, HDRS ≥ 18	DBT + Medication CM (17); Medication CM (17)	None	2 (5.6)	66, 60-80, ≥60	Yes	Physical	CO	Group (28)	BDI-21, BHS-20, HDRS-17	Pre, post, 6-month follow-up
Moss (2009) Dissertation (Published in 2012)	Community & Clinical, Outpatient, 76.92%	Subthreshold depression. BDI ≥ 10	BA Bibliotherapy (13)	Delayed Tx WLC (NA), (13)	8 (30.8)	77.5, 65-89, ≥65	Allowed if ≥ 1 month stabilized	None reported	ITT	Bibliotherapy (4 weeks)	GDS-30, HDRS-17	Pre, post, 1-month follow-up
Norton (2010) Dissertation	Clinical, Inpatient, 50%	Maj./min./dyst. GDS ≥ 9	Brief BA + Hospital TAU (24)	TAU (A), (25)	19 (38.8)	72.2, 65-81, ≥65	Yes	Psychological	ITT	Group (8)	GDS-30	Pre, post
Oxman & Hull (2001)	Clinical, Outpatient, 41%	Min./dyst. HDRS ≥ 10, PRIME-MD, SCID	PST-PC (104); Paroxetine (93)	Pill Placebo with CM (A), (110)	108 (26)	71, ≥60	No	Physical	CO	Individual (6)	HDRS-17	Pre, post

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Rokke et al. (1999)	Community & Clinical, Outpatient, 37.50%	Maj./min./dyst. HDRS ≥ 10, BDI ≥ 10, GDS ≥ 11	CBT-based SMT-cognitive or behavioral target (17); BT (10); CT (12)	WLC (NA), (23)	24 (37.5)	66, 60-86, ≥60	Yes	Mix of multiple conditions	CO	Individual (10)	BDI-21, GDS-30, HDRS-17	Pre, post, 3-, 12-month follow-up
Rokke et al. (2000)	Community & Clinical, Outpatient, 75%	MDD. SCID-P	CBT-based SMT (9)	WLC (NA), (16); EC (A), (9)	6 (15)	67.2, 60-86, ≥60	Yes	Mix of multiple conditions	CO	Group (10)	BDI-21, GDS-30, HDRS-17	Pre, post, 1-, 3-, 12-month follow-up
Sallis et al. (1983)	Community, Outpatient, 83%	Maj./min./dyst. BDI ≥ 12	CBT (8)	Attention-placebo (A), (8)	14 (36.8)	71.3, ≥60	Yes	Mix of multiple conditions	CO	Group (10)	BDI-21	Pre, post, 1-month follow-up
Scogin et al. (1987)	Community, Outpatient, 79.31%	Maj./min./dyst. HDRS ≥ 10	Cognitive Bibliotherapy (9)	WLC (NA), (8); Attention-control (A), (8)	9 (31)	70, ≥60	Yes	None reported	CO	Bibliotherapy (4 weeks)	BDI-13, GDS-30, HDRS-17	Pre, post, 1-month follow-up
Scogin et al. (1989) and Scogin et al. (1990) follow-up	Community, Outpatient, 85.07%	Maj./min./dyst. HDRS ≥ 10	Cognitive Bibliotherapy (21); Behavioral Bibliotherapy (19)	WLC (NA), (21)	23 (34.3)	68.3, ≥60	Yes	None reported	CO	Bibliotherapy (4 weeks)	GDS-30, HDRS-17	Pre, post, 6-, 24-month follow-up
Serfaty et al. (2009)	Clinical, Outpatient, 79.41%	Maj./min./dyst. GMSHES-AGECAT, BDI-II ≥ 14	CBT (64)	TC (A), (58); TAU (A), (55)	27 (13.2)	74.1, ≥65	Yes	None reported	CO	Individual (12)	BDI-II-21	Pre, post, 6-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Shah (2010) Dissertation	Community & Clinical, Outpatient, 80%	Maj./min./dyst. GDS ≥ 10	ACBT (15)	Delayed Tx WLC (NA), (16)	5 (14.7)	63.6, 55-88, ≥55	Yes	None reported	CO	Self Guide CBT Audio CDs with workbook (4 weeks)	BSI-D-6, GDS-30, HDRS-17	Pre, post
Snarski et al. (2011)	Clinical, Inpatient, 60%	Subthreshold. GDS-S ≥ 3	BA (25)	TAU (A), (25)	21 (42)	71.67, 63-87, ≥65	No	Mix of multiple conditions	ITT	Individual (8)	GDS-S-15	Pre, post
Sood et al. (2003)	Clinical, Inpatient, 42.86%	Maj./min./dyst. GDS ≥ 11	CBT (6)	TAU standard OT (A), (8)	5 (26.3)	80.79, ≥60	No	Physical	CO	Individual (54)	GDS-30	Pre, post
Steuer et al. (1984)	Community & Clinical, Outpatient, 75.76%	MDD. DSM-III criteria, HDRS ≥ 16	CBT (16); PD (17);	None	13 (39.4)	66, 55-78, ≥55	No	Physical	ITT	Group (46)	BDI-13, HDRS-21, SDS-20	Pre, post
Strachowski et al. (2008)	Community & Clinical, Outpatient, 66.67%	MDD. BDI ≥ 10, DISH	CBT (19)	WLC (NA), (22)	7 (14.6)	62, ≥55	Yes	Physical	CO	Individual (16)	BDI-II-21, HDRS-17	Pre, post
Teri et al. (1997)	Clinical, Inpatient, 47.22%	Maj./min. SADS/RDC, HDRS ≥ 10	BT-PE (23); BT-PS (19)	WLC (NA), (20); TCC (A), (10)	16 (18.2)	76.4, ≥60	No	Cognitive (dementia)	CO	Individual (9)	BDI-21, CSDD-19, HDRS-17, RDC	Pre, post, 6-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Thompson et al. (1987) and Gallagher-Thompson et al. (1990) follow-up	Community, Outpatient, 67.37%	MDD. SADS/RDC, BDI ≥ 17, HDRS ≥ 14	BT (25); CT (27); BPT (24)	Delayed Tx WLC (NA), (19)	29 (24.2)	67, 60-80, ≥60	Allowed if ≥ 3 months stabilized	None reported	CO	Individual (16-20)	BDI-21, BHS-20, BSI-D-6, GDS-30, HDRS-17, RDC	Pre, post, 12-, 24-month follow-up
Thompson et al. (2001)	Community & Clinical, Outpatient, 67%	MDD. SADS/RDC, HDRS ≥ 14, BDI ≥ 16	CBT (31); Desipramine (33); CBT + Desipramine (36)	None	31 (30.4)	66.8, ≥60	No	None reported	ITT	Individual (16-20)	BDI-21, HDRS-17	Pre, post
Williams et al. (2000)	Clinical, Inpatient, 41.45%	Minor Depression or Dysthymia. PRIME-MD, HDRS ≥ 10	PST-PC (138); Paroxetine (137)	Pill Placebo (A), (140)	104 (25)	71, 60-93, ≥60	No	Mix of multiple conditions	ITT	Individual (6)	HDRS-17, HSCL-D-20	Pre, post
Wilson et al. (1995)	Clinical, Inpatient, 83.87%	MDD. DSM-III- R criteria, HDRS ≥ 17	CBT + TAU (8); Lithium (7); CBT+ Lithium (9)	Pill Placebo (A), (7)	31 (50)	75.5	Yes	None reported	CO	Individual (14 weekly sessions plus 10-15 booster sessions)	HDRS-17	Pre, post, 6-, 12-month follow-up

Study	Referral, Treatment Setting, % Female	Diagnostic Inclusion Criteria	Intervention Groups (Post-tx *N*)	Control Groups (Post-tx *N*)	Attrition Post-tx *N* (%)	Age Mean, Range, Min.	Concurrent Antidepressants	Comorbid Conditions	Analysis	Treatment Format (Sessions *N*)	Depression Outcome Measures	Assessment Periods
Wuthrich & Rapee (2013) Community, Outpatient, 64.52%	Maj./min. ADIS	CBGT (20)	WLC (NA), (27)		15 (24.2)	67.4, 60-84, ≥60	Yes	Psychological (Anxiety)	ITT	Group (12)	GDS-30, CES-D-20	Pre, post, 3-month follow-up

Note. Measures. ADIS = Anxiety Disorders Interview Schedule for DSM-IV; AGECAT = Automated Geriatric Examination for Computer Assisted Taxonomy; BDI = Beck Depression Inventory; BHS = Beck Hopelessness Scale; BSI-D = Brief Symptom Inventory-Depression Subscale; CES-D = Center for Epidemiological Studies Depression Scale; DDES = Duke Depression Evaluation Schedule; DISH = Depression Interview and Structured Hamilton; EDS = Edinburgh Depression Scale; GDS = Geriatric Depression Scale; GMSHES = Geriatric Mental State and History and Etiology Schedule; HDRS = Hamilton Depression Rating Scale; HR-Skala = Hopelessness Scale; HSCL-D = Hopkins Symptom Checklist Depression Scale; IDD = Inventory to Diagnose Depression; MADRS = Montgomery-Asberg Depression Rating Scale; MINI = Mini-International Neuropsychiatric Interview; NOSIE-D-30 = Nurses' Observation Scale For Inpatient Evaluation; PRIME-MD = Primary Care Evaluation of Mental Disorder; RDC = Research Diagnostic Criteria; SADS = Schedule for Affective Disorders and Schizophrenia; SDS = Zung Self-Rating Depression Scale; WDI = Wakefield Depression Inventory; WHO CIDI = World Health Organization Composite International Diagnostic Interview.
Treatment. ACBT = Audio-Based Cognitive Behavioral Therapy; BA = Behavior Activation; BPT = Brief Psychodynamic Therapy; BT = Behavior Therapy; BT+PE = Behavior Therapy Pleasant Events; BT+PS = Behavior Therapy Problem Solving; CBT = Cognitive-Behavioral Therapy; CBGT = Cognitive-Behavioral Group Therapy; CM = Clinical Management; CT = Cognitive Therapy; EC = Education Control; FVIGT = Focused Visual Imagery Group Therapy; GFGP = Goal-Focused Group Psychotherapy; HC = Home Care; HD = Home-Delivered Intervention; MBCT = Mindfulness-Based Cognitive Therapy; OT = Occupational Therapy; PC = Primary Care; PD = Psychodynamic Therapy; PST = Problem-Solving Therapy; RT = Reminiscence Therapy; SM = Stress Management; SMT = Self-Management Therapy; ST = Supportive Therapy; TAU = Treatment-as-usual; TC = Talking Control; TCC = Typical Care Control; UC = Usual Care; WLC = Waiting-List Control.
Study. A = active; NA = nonactive; CO = Completers-Only; ITT = intent-to-treat; N = no, Y = yes; MD = major depression; Maj./min./dyst. = combined sample of participants with major depression, minor depression, and/or dysthymia; N = number of participants at posttreatment.

CBT-BIs Versus Controls at Posttreatment

The 42 studies with 52 effect size comparisons of CBT-BIs versus controls with older adults (totalling 2,925 participants) were analyzed using a random effects model. As shown in Table 2, CBT-BIs were significantly superior to control conditions in reducing depression symptoms at posttreatment (g = -0.63, p < .001). Significant heterogeneity was found to be within the moderate range (I^2 = 66.12%).

CBT-BIs versus controls at follow-up. Twelve studies provided CBT-BI outcome data at follow-up. Results from 1–3 months follow-up showed a moderate treatment effect (g = -0.60, p = .004; I^2 = 77.88%), 6–9 months follow-up demonstrated a borderline moderate treatment effect (g = -0.49, p = .003; I^2 = 71.92%), and there was a nonsignificant treatment effect at 10–12 months follow-up (g = -0.14, p = .336). Results are shown in Table 2.

Follow-up post-hoc meta-analysis. The four studies (five comparisons) that constituted the effect size at 10–12 months follow-up all consisted of active control conditions, which were found to substantially decrease effect sizes in comparison to nonactive control conditions. To assess whether CBT-BIs maintained a treatment effect or if treatment effects truly attenuate at 10–12 months follow-up periods, a post-hoc meta-analysis was performed on CBT-BIs at 10–12 months follow-up in comparison to the active control conditions at pretreatment in order to isolate the effect of active controls. Results showed a significant and large effect size of g = -0.81 (95% CI: -1.13 to -0.49, SE = 0.17, Z = -4.90, df = 4, p < .001; *NNT* = 3.2), with significant and moderate heterogeneity I^2 = 57.23% (Q = 9.35, df = 4, p = .053).

CBT-BIs Versus Other Treatments

A posttreatment random effects meta-analysis revealed CBT-BIs alone were not superior to other psychotherapy interventions (g = -0.30, p = .062), pharmacotherapy (g = -0.16, p = .319), or CBT plus pharmacotherapy versus pharmacotherapy alone (g = -0.35, p = .172). See Table 3.

CBT-BIs versus other treatments at follow-up. Follow-up data at 1–3 months showed that CBT-BIs outperformed other psychotherapies with a moderate treatment effect (g = -0.53, p < .001), at 6–9 months revealed a large treatment effect (g = -0.85, p < .001), and at 10–12 months demonstrated a small treatment effect (g = -0.35, p < .055). No analyses were performed on follow-up for CBT versus pharmacotherapy and combined treatment versus pharmacotherapy due to a lack of studies. See Table 3.

Sensitivity Analyses

Sensitivity analyses were conducted on posttreatment CBT-BIs in order to examine the effect of violating the assumption of independence and exploring alternative results had we used different inclusion criteria (e.g., limited our study to dichotomous depression outcome data only).

Table 2
Overall Results of Studies Examining the Effects of CBT-BIs Compared to Controls at Posttest and Follow-up

	Effect Size Estimates						Test of Heterogeneity		
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*
All studies at posttest	52	-0.63 (0.07)	-0.76 to -0.49	-8.82	<0.001	4.1	66.12	150.55	<0.001
Follow-up all studies									
1 to 3 months	12	-0.60 (0.21)	-1.00 to -0.19	-2.86	0.004	4.2	77.88	49.74	<0.001
6 to 9 months	10	-0.49 (0.16)	-0.81 to -0.17	-2.99	0.003	5.2	71.92	32.05	<0.001
10 to 12 months	5	-0.14 (0.14)	-0.42 to 0.14	-0.96	0.336	18.2	44.48	7.20	0.125

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance.

Table 3
Results of Studies Examining the Effects of CBT-BIs Compared to Different Types of Interventions at Posttest and Follow-up

	Effect Size Estimates						Test of Heterogeneity		
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*
CBT-BIs versus other tx									
CBT versus other psychotherapy	10	-0.30 (0.16)	-0.62 to 0.02	-1.86	0.062	8.4	48.94	17.63	0.040
CBT versus medication	6	-0.16 (0.16)	-0.47 to 0.15	-1.00	0.319	15.9	61.79	13.09	0.023
CBT + medication versus medication	3	-0.35 (0.26)	-0.86 to 0.15	-1.37	0.172	7.2	36.20	3.13	0.209
CBT versus other psychotherapy follow-up									
1 to 3 months	6	-0.53 (0.16)	-0.85 to -0.21	-3.26	0.001	4.8	0.00	1.36	0.928
6 to 9 months	2	-0.85 (0.32)	-1.48 to -0.22	-2.64	0.008	3.1	0.00	0.20	0.659
10 to 12 months	4	-0.35 (0.18)	-0.70 to 0.01	-1.92	0.055	7.2	0.00	2.32	0.509

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance.

Test of violation of assumption of independence. Sensitivity analyses were conducted to examine the effect of violating the assumption of effect size independence by including in the meta-analysis single studies that have more than one effect size. Results of this sensitivity analysis indicated that including studies with multiple effect size comparisons did not unduly influence the statistical significance (p < .001), magnitude of the overall mean effect size (g = -0.65/-0.59 versus -0.63), or level of heterogeneity (I^2 = 71.56%/68.31% versus 66.12%). See Table 4.

Remitted, remained depressed, versus improved. A meta-analysis on dichotomous depression outcome data showed that CBT-BIs with participants whose depression had remitted versus those who remained depressed at posttreatment demonstrated large treatment effects (g = -0.83, p < .001) with moderate heterogeneity (I^2 = 57.90%). Similarly, participants whose depression had improved versus those who remained unchanged or deteriorated at posttreatment showed large treatment effects (g = -0.79, p < .001) and moderate heterogeneity (I^2 = 67.55%). See Table 4.

Type of outcome measure. Examining the differences among the three most common depression outcome measures revealed a large treatment effect when using the HDRS (g = -0.81, p < .001; I^2 = 65.93%), and moderate treatment effects for both the GDS (g = -0.67, p < .001; I^2 = 65.50%) and BDI (g = -0.59, p < .001; I^2 = 57.31%). See Table 4.

Subgroup Analyses

Fifteen moderators were analyzed in subgroup analyses to examine systematic differences between CBT-BIs and control conditions on depression outcome measures at posttreatment. Subgroup analyses were partitioned into three categories that examined participant, intervention, and study level characteristics.

Participant characteristics. As presented in Table 5, participant characteristics subgroup analyses demonstrated that the effect size of CBT-BIs was significantly moderated by the source from which participants were recruited (Q_B = 9.63, p = .008). Participants recruited from community settings showed a large treatment effect (g = -0.92, p < .001), whereas small to moderate treatment effects were observed among studies that recruited from clinical settings (g = -0.45, p < .001) and studies that combined settings (g = -0.56, p < .001). The effect size for CBT-BIs on outcomes was not moderated by type of depression diagnosis (p = .605), age category (p = .076), comorbidity (p = .932), or concurrent pharmacotherapy (p = .993). It is worth noting that although the overall effect of age group was not significant, parameter estimates only found significant effect sizes for young-old (60–69; g = -0.78, p < .001) and middle-old (70–79; g = -0.59, p < .001), but not for old-old (80+; g = -0.26, p = .240). Despite the lack of statistical significance, there were substantial qualitative differences in treatment effects between age categories in the sample.

Intervention characteristics. Subgroup analyses on intervention characteristics showed that the type of CBT-BI significantly moderated depression outcome effect sizes (Q_B = 12.11, p = .017; see Table 6). Participants who received CT demonstrated the best treatment gains at posttreatment with a large treatment effect (g =

Table 4
Sensitivity Analyses

		Effect Size Estimates					Test of Heterogeneity		
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*
All studies at posttest	52	-0.63 (0.07)	-0.76 to -0.49	-8.82	<0.001	4.1	66.12	150.55	<0.001
One effect size per study (highest)	42	-0.65 (0.08)	-0.82 to -0.49	-7.84	<0.001	3.9	71.56	144.19	<0.001
One effect size per study (lowest)	42	-0.59 (0.08)	-0.74 to -0.43	-7.42	<0.001	4.3	68.31	129.37	<0.001
Remission	11	-0.83 (0.17)	-1.17 to -0.49	-4.80	<0.001	3.1	57.90	23.75	0.008
Improvement	10	-0.79 (0.17)	-1.12 to -0.47	-4.78	<0.001	3.3	67.55	27.73	0.001
HDRS only	29	-0.81 (0.10)	-1.02 to -0.61	-7.75	<0.001	3.2	65.93	82.18	<0.001
GDS only	26	-0.67 (0.12)	-0.91 to -0.44	-5.60	<0.001	3.8	65.50	72.47	<0.001
BDI only	25	-0.59 (0.10)	-0.77 to -0.40	-6.12	<0.001	4.3	57.31	56.22	<0.001

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance; BDI = Beck Depression Inventory; GDS = Geriatric Depression Scale; HDRS = Hamilton Depression Rating Scale.

Table 5
Subgroup Analyses and Effect Size Estimates of Participant Characteristics in CBT-BIs Compared to Controls at Posttest

	Effect Size Estimates						Test of Heterogeneity			Subgroup Analyses			
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*	Q_B	*p*	Q_W	*p*
Depression diagnosis										1.01	0.605	55.72	0.237
Major depression	15	-0.73 (0.12)	-0.95 to -0.50	-6.31	<0.001	3.5	45.50	25.69	0.028				
Minor/dysth/sub	10	-0.55 (0.17)	-0.88 to -0.23	-3.35	0.001	4.6	78.04	40.98	<0.001				
Major/minor/dysth/sub	27	-0.60 (0.10)	-0.80 to -0.40	-5.94	<0.001	4.2	63.58	71.38	<0.001				
Age category										5.17	0.076	58.34	0.170
Young-old (60 to 69)	18	-0.78 (0.10)	-0.97 to -0.58	-7.79	<0.001	3.3	33.96	25.74	0.079				
Middle-old (70 to 79)	30	-0.59 (0.09)	-0.77 to -0.41	-6.33	<0.001	4.3	69.72	95.78	<0.001				
Old-old (80+)	4	-0.26 (0.22)	-0.69 to 0.17	-1.18	0.240	9.7	48.61	5.84	0.120				
Comorbidity										0.85	0.932	48.77	0.402
Cognitive	7	-0.55 (0.10)	-0.74 to -0.35	-5.52	<0.001	4.6	0.00	4.31	0.634				
Physical	12	-0.67 (0.16)	-0.98 to -0.36	-4.28	<0.001	3.8	76.67	47.15	<0.001				
Psychological	3	-0.75 (0.56)	-1.85 to 0.35	-1.34	0.179	3.4	90.15	20.30	<0.001				
Multiple conditions	10	-0.51 (0.19)	-0.89 to -0.13	-2.61	0.009	5.0	76.02	37.53	<0.001				
None	20	-0.63 (0.10)	-0.83 to -0.42	-6.02	<0.001	4.1	46.52	35.53	0.012				
Concurrent pharmacotherapy										0.00	0.993	54.31	0.314
Yes	30	-0.63 (0.09)	-0.81 to -0.45	-6.85	<0.001	4.1	63.52	79.49	<0.001				
No	22	-0.63 (0.12)	-0.85 to -0.40	-5.42	<0.001	4.1	70.29	70.69	<0.001				
Recruitment										9.63	0.008	57.97	0.178
Clinical	24	-0.45 (0.09)	-0.63 to -0.28	-5.04	<0.001	5.6	64.42	64.63	<0.001				
Community	18	-0.92 (0.12)	-1.15 to -0.68	-7.55	<0.001	2.9	46.61	31.84	0.016				
Clinical and community	10	-0.56 (0.13)	-0.83 to -0.30	-4.19	<0.001	4.5	44.84	16.31	0.061				

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance.

-0.88, $p < .001$). Significant and moderate treatment effects were found for BT (g = -0.69, $p < .001$), PST (g = -0.64, $p < .001$), and CBT (g = -0.61, $p < .001$). On the other hand, BA showed nonsignificant treatment effects (g = -0.04, p = .814) at posttreatment. This analysis, however, may have been underpowered due to small study sample (k = 3) and comparatively small participant sample (N = 125).

The length of treatment in weeks significantly moderated depression outcome effect sizes (Q_B = 10.55, p = .005). Treatment length of 2–13 weeks demonstrated a moderate treatment effect (g = -0.68, $p < .001$), 14–20 weeks showed a borderline moderate treatment effect (g = -0.49, p = .012), and a nonsignificant treatment effect was found for 24–36 weeks (g = 0.20, p = .445). A decrease in treatment effect was observed beyond 13 weeks, although generalizing results for 24–36 weeks of treatment length must be made with caution. Power to detect significance for length of treatment between 24 and 36 weeks was low (power = 30%). The effect size of CBT-BIs on outcomes was not moderated by diagnostic measure (p = .853), treatment setting (p = .105), treatment format (p = .826), total number of sessions (p = .507), or number of sessions per week (p = .183).

Study characteristics. Study characteristics subgroup analyses demonstrated that control condition type significantly moderated depression outcome effect sizes (Q_B = 19.46, $p < .001$; see Table 7). Studies that used a nonactive control condition showed a large treatment effect (g = -0.92, $p < .001$), whereas a small treatment effect was observed for studies that used an active control condition (g = -0.37, $p <$ .001). Type of analysis significantly moderated depression outcome effect sizes (Q_B = 9.51, p = .002). Studies that used completer-only samples showed a moderate treatment effect (g = -0.72, $p < .001$), whereas a small treatment effect was found for studies that reported outcome data by the method of intention-to-treat (g = -0.34, $p < .001$). The effect size of CBT-BIs on outcomes was not moderated by study design (p = .272). Although the difference was not statistically significant, the lower quality nonrandomized trials demonstrated a larger effect size (g = -0.92, $p < .001$) than did randomized trials (g = -0.58, $p < .001$).

Metaregression

Quality of study, dropout percentage, gender (percentage of females), and publication date were chosen *a priori* to conduct univariate metaregression analyses. These variables were used as predictors of depression outcome effect sizes (Table 8). Quality of study (B = 0.03, p = .008), dropout percentage (B = 0.01, p = .011), and gender (B = -0.01, p = .005) significantly predicted depression outcome effect sizes. Study publication date was not significantly associated with depression outcome effect sizes (B = 0.00, p = .891).

Two post-hoc Pearson correlations were performed to further evaluate the relationships between predictor variables. First, the relationship between the percentage of males and dropout rate among the studies was found to be statistically significant, but small in magnitude (r = .28, p = .05; see Figure 4). Finally, a post-hoc analysis of the relationship between number of years since publication and quality of study revealed a statistically significant and strong correlation (r = .65, $p < .001$; see Figure 5).

Table 6

Subgroup Analyses and Effect Size Estimates of Intervention Characteristics in CBT-BIs Compared to Controls at Posttest

	Effect Size Estimates						Test of Heterogeneity			Subgroup Analyses			
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*	Q_B	*p*	Q_W	*p*
CBT-BI type										12.11	0.017	51.71	0.295
Cognitive-Behaviour Therapy	26	-0.61 (0.11)	-0.83 to -0.40	-5.58	<0.001	4.2	69.85	82.92	<0.001				
Cognitive Therapy	6	-0.88 (0.19)	-1.25 to -0.51	-4.68	<0.001	3	37.67	8.02	0.155				
Behaviour Therapy	7	-0.69 (0.13)	-0.94 to -0.43	-5.30	<0.001	3.7	0.00	4.83	0.566				
Behavioural Activation	3	-0.04 (0.18)	-0.40 to 0.31	-0.23	0.814	64.4	5.07	2.11	0.349				
Problem-Solving Therapy	10	-0.64 (0.15)	-0.92 to -0.35	-4.30	<0.001	4	73.38	33.81	<0.001				
Diagnostic measure										0.32	0.853	49.07	0.471
Clinician-rated	15	-0.66 (0.13)	-0.91 to -0.41	-5.22	<0.001	3.9	58.14	33.45	<0.001				
Participant self-rated	13	-0.63 (0.22)	-1.07 to -0.19	-2.81	0.005	4.1	77.92	54.35	0.002				
Clinician and self-rated	24	-0.58 (0.09)	-0.75 to -0.40	-6.60	<0.001	4.4	60.75	58.59	<0.001				
Treatment setting										2.62	0.105	53.64	0.336
Inpatient	14	-0.45 (0.12)	-0.68 to -0.23	-3.91	<0.001	5.6	45.20	23.72	0.034				
Outpatient	38	-0.69 (0.09)	-0.86 to -0.52	-7.87	<0.001	3.7	70.34	124.73	<0.001				
Format										0.38	0.826	53.08	0.320
Individual	27	-0.63 (0.09)	-0.81 to -0.45	-6.88	<0.001	4.1	66.56	77.82	<0.001				
Group	16	-0.63 (0.16)	-0.95 to -0.32	-3.98	<0.001	4.1	71.96	53.49	<0.001				
Bibliotherapy/self-help	9	-0.53 (0.15)	-0.81 to -0.24	-3.62	<0.001	4.8	38.23	12.95	0.114				
Number of Sessions										2.33	0.507	51.95	0.323
4 to 13	34	-0.66 (0.09)	-0.83 to -0.49	-7.52	<0.001	3.9	71.43	115.51	<0.001				
14 to 20	7	-0.70 (0.25)	-1.18 to -0.21	-2.83	0.005	3.7	63.74	16.55	0.011				
24 to 54	2	-0.06 (0.43)	-0.91 to -0.78	-0.15	0.882	42.8	42.69	1.74	0.187				
Self-help	9	-0.53 (0.15)	-0.81 to -0.24	-3.62	<0.001	4.8	38.23	12.95	0.114				
Treatment length (weeks)										10.55	0.05	50.07	0.431
2 to 13	44	-0.68 (0.08)	-0.83 to -0.53	-8.73	<0.001	3.8	66.65	128.93	<0.001				
14 to 20	6	-0.49 (0.19)	-0.87 to -0.11	-2.50	0.012	5.2	64.43	14.06	0.015				
24 to 36	2	0.20 (0.27)	-0.32 to 0.72	0.76	0.445	12.7	0.00	0.13	0.719				
Number of weekly sessions										4.85	0.183	50.28	0.383
1 session	29	-0.57 (0.08)	-0.73 to -0.41	-6.86	<0.001	4.5	62.73	75.13	<0.001				
2 sessions	11	-0.94 (0.22)	-1.36 to -0.51	-4.32	<0.001	2.8	74.10	38.61	<0.001				
4 sessions	3	-0.20 (0.27)	-0.73 to 0.33	-0.74	0.461	12.7	47.62	3.82	0.148				
Self-help	9	-0.53 (0.15)	-0.81 to -0.24	-3.62	<0.001	4.8	38.23	12.95	0.114				

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance.

Table 7
Subgroup Analyses and Effect Size Estimates of Study Characteristics in CBT-BIs Compared to Controls at Posttest

	Effect Size Estimates						Test of Heterogeneity			Subgroup Analyses			
Comparison	*k*	*g* (SE)	95% CI	*Z*	*p*	*NNT*	I^2	*Q*	*p*	Q_B	*p*	Q_W	*p*
Control condition										19.46	<0.001	57.16	0.226
Active	28	-0.37 (0.07)	-0.52 to -0.23	-5.11	<0.001	6.8	52.34	56.65	0.001				
Nonactive	24	-0.92 (0.10)	-1.12 to -0.72	-9.18	<0.001	2.9	46.34	42.86	0.007				
Study design										1.20	0.272	53.24	0.351
RCT	45	-0.58 (0.07)	-0.72 to -0.44	-8.23	<0.001	4.4	62.78	118.23	<0.001				
Non-RCT	7	-0.92 (0.30)	-1.51 to -0.33	-3.07	0.002	2.9	75.18	24.18	<0.001				
Type of analysis										9.51	0.002	50.49	0.454
Intention-to-treat	12	-0.34 (0.09)	-0.51 to -0.16	-3.85	<0.001	7.4	34.90	16.90	0.111				
Completers-only	40	-0.72 (0.09)	-0.90 to -0.54	-7.97	<0.001	3.6	68.56	124.04	<0.001				

Note. *k* = number of comparisons; *g* = Hedge's g effect size; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *NNT* = numbers-needed-to-treat; I^2 = percentage of total variance; *Q* = variance between studies as a proportion of total variance; RCT = randomized controlled trial.

Table 8
Regression Coefficients of CBT-BIs Compared to Controls in Relation to Effect Size for Depression Outcome Measures: Univariate Metaregression

	Regression Coefficient					Test of Heterogeneity	
Study Characteristic	*k*	*B* (SE)	95% CI	*Z*	*p*	*Q*	*p*
Quality of studies	51	0.03 (0.01)	0.01 to 0.05	2.67	0.008	7.12	0.008
Dropout percentage	52	0.01 (0.01)	0.00 to 0.02	2.56	0.011	6.53	0.011
Gender	48	-0.01 (0.00)	-0.02 to 0.00	-2.84	0.005	8.04	0.005
Publication date	52	0.00 (0.01)	-0.02 to 0.02	0.14	0.891	0.02	0.891

Note. Mixed effects unrestricted maximum likelihood meta-regression. *k* = number of comparisons; *B* = Point estimate of the meta-regression slope; SE = standard error; CI = confidence interval; *Z* = Z-score; *p* = significance level; *Q* = variance between studies as a proportion of total variance.

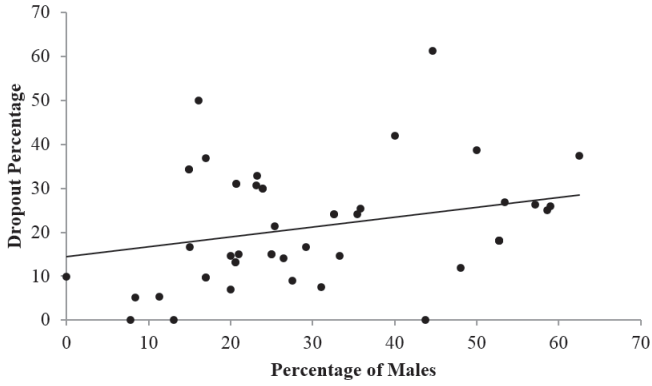

Figure 4. Scatter plot of dropout percentage by percentage of males.

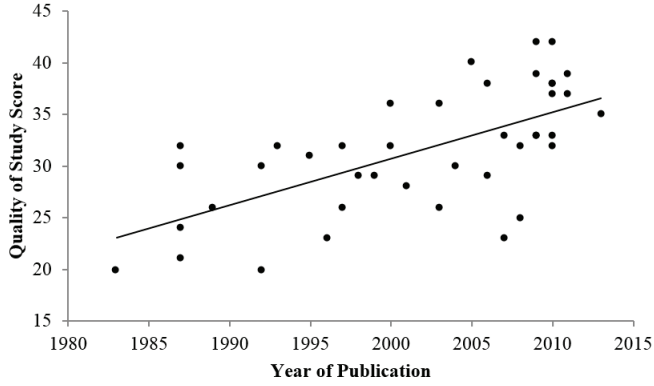

Figure 5. Scatter plot of total Quality of Study scores by year of study publication.

Publication Bias

A fail-safe *N* analysis was conducted to examine the number of potentially missing, nonsignificant studies that would be needed to nullify the significant effect of the standardized mean difference for CBT-BIs compared to control conditions. This analysis revealed that there would need to be 2,577 studies with null results for the current *p*-value to exceed the 0.05 level. Further, a Duval and Tweedie's Trim and Fill analysis revealed a symmetrical funnel plot (Figure 6). The symmetrical funnel plot suggests that a sufficient quantity of relevant studies were captured in the meta-analysis, with an indication that there are likely no missing studies.

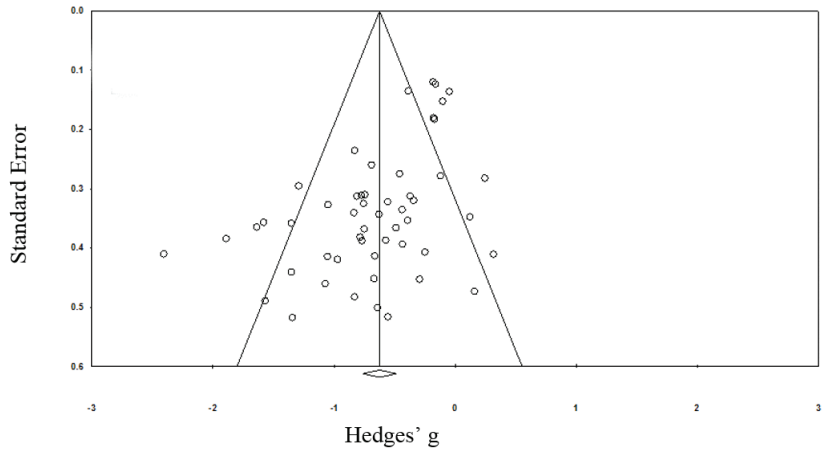

Figure 6. Funnel plot analysis of publication bias.

DISCUSSION

Depression is a debilitating mental health condition that causes significant impairment, especially among vulnerable populations such as the elderly. Given the strong empirical support of CBT-BIs for the treatment of depression among youth and adults, this meta-analysis examined the effectiveness of these interventions among depressed older adult populations. Results showed that CBT-BIs were significantly more effective than control conditions, producing a moderate treatment effect when compared to both control group types combined (i.e., active and nonactive controls). When separated, the treatment effects for CBT-BIs were large when compared to nonactive controls (e.g., wait-list) and small when compared to active control conditions (e.g., education group).

While the statistically significant attenuation of effect-sizes in the CBT-BIs versus active control groups implies that much of the variance may be accounted for by nonspecific therapeutic factors (Laska, Gurman, & Wampold, 2013), there may still be an advantage to using CBT-BIs over other nonspecific interventions (e.g., support groups, educational groups). CBT-BIs, in comparison to active and nonactive control conditions combined, showed significant but moderate treatment effects on depression outcome measures up to 9 months. Results of a post-hoc analysis showed that, when controlling for the effects of active control groups, participants treated with CBT-BIs had significantly lower depression symptoms at the 10–12 months follow-up. This finding indicates that depressed older adults who receive CBT-BIs may maintain treatment benefits for at least up to a year.

At posttreatment, CBT was found to be no more effective than other psychotherapies designed to treat depression. However, follow-up data again demonstrated that CBT-BIs were superior in long-term maintenance compared to other psychotherapies. This finding is potentially due to the adaptive skills-based nature

of CBT-BIs. Patients learn techniques that they practice between therapy sessions to gain mastery. These strategies can be used after therapy termination to reduce vulnerability to depression and address symptoms when they occur.

CBT-BIs were found to be just as effective for treating depressive symptoms as pharmacotherapy at posttreatment. This finding is encouraging for the utility of psychotherapy (i.e., talk-based interventions for depression, given the commonly reported adverse side effects from taking antidepressant medications that older adults may need to avoid). Combining CBT-BIs and pharmacotherapy was no more effective than pharmacotherapy alone. There was an insufficient number of studies with longer-term follow-up data to compare CBT-BIs and pharmacotherapy.

In the subgroup analysis, CT performed the best among the CBT-BI types with a large treatment effect. BT, PST, and CBT were comparable to each other, with moderate range treatment effects. BA performed the worst out of the CBT-BIs with a nonsignificant treatment effect. It is not possible to determine why BA was less effective from this meta-analysis. It is possible that BA is less effective because the physical or cognitive limitations associated with older age interfere with the effectiveness of the behavioural activities. This potential explanation deserves exploration in future studies. Also, there were fewer studies evaluating BA than other treatments, which could have influenced the findings. Thus, adding more research on the effectiveness of BA among elderly who are depressed would be extremely useful. In summary, we suggest that CT should be considered as a first-line treatment, whereas current evidence indicates that BA may not be as effective with this population.

Analyses of the three most common depression outcome measures included in the studies showed that a larger effect size was derived from the clinician-rated measure (HDRS) compared to self-report instruments (e.g., GDS and BDI). This difference could be due to biases in assessor or participant reporting of depressive symptoms, item content differences (e.g., scales that include items that rely heavily on physical symptoms), and differences in the weighing of items. The BDI had the smallest effect size among the three most common depression outcome measures, which could be a result of the inclusion of somatic symptoms (Smarr & Keefer, 2011). Because older adults are more prone to physical ailments, their overall score on the BDI is often inflated by endorsing somatic complaints in both the patient and control group. This would create a ceiling effect that might mask subtle differences between groups. Thus, the BDI may not be the most appropriate measure for use in both research with this population and in clinical practice with older adults. Self-report measures validated with this population, such as the GDS, are likely to provide information that is more accurate for determining depression severity and treatment planning with older adults.

Subgroup analyses also revealed that treatment effects were moderated by recruitment source, treatment length, and type of analysis. Results showed that participants recruited from a community setting showed large treatment effects, whereas those recruited from clinical settings (or combined clinical/community)

demonstrated moderate range treatment outcomes. This could be due to the likelihood that patients from clinical settings tend to have more severe or chronic symptoms than individuals recruited from the community in general. Future research should examine differential factors among patients treated in different settings to determine why some appear to benefit more from a depression treatment than others. Clinically, therapists should consider the possibility that patients who have undergone treatment for depression in other clinical settings might be less responsive to psychotherapeutic interventions compared to treatment-naïve patients.

Results of the subgroup analysis on length of treatment suggested that more therapy does not necessarily lead to better outcomes. Participants who received CBT-BIs between 2–13 weeks and 14–20 weeks demonstrated moderate treatment effects. Those treated longer than 20 weeks had a nonsignificant treatment effect. It is unclear if this nonsignificant finding was due to characteristics of the participants (e.g., diagnostic severity, cognitive decline) or because there were too few studies with longer-term treatment to conduct additional analyses. Regarding clinical implications, if older patients with depression are not showing benefit by 14–20 weeks of CBT-oriented therapy, a change in treatment approach that better accommodates the unique needs of older adults may be warranted.

The subgroup comparison of type of analysis revealed that completers-only depression outcome data showed significantly higher effect sizes than studies that used intention-to-treat data. Intention-to-treat analysis includes data from the last depression assessment carried forward to include data from dropouts or other sources of missing data. Thus, when researchers analyzed data only from participants who engaged in the full course of treatment, the studies yielded more favourable results. This finding highlights an important consideration: treatments may appear to have different levels of effectiveness when, in actuality, the type of analysis employed by the researchers affects the magnitude of the treatment effects. End users of psychotherapy outcome research should take these factors into account when making a decision regarding their treatment of choice based on different studies. It may be beneficial for clinicians to emphasize with depressed older adults that treatment gains are typically largest for patients who commit to the full course of CBT-based treatment for depression compared to those who drop out of treatment prematurely.

Metaregression revealed that dropout rate, participant gender, and quality of the study were significantly predictive of treatment outcome effect size. As expected, studies with high dropout rates had smaller treatment effects than studies with lower dropout rates. Studies with a higher percentage of females had larger overall treatment effects than studies with a higher percentage of males. Furthermore, there was an association between gender and dropout rate; a correlational analysis revealed that studies with more males also had higher dropout rates.

There are several possible explanations for the findings on gender differences. First, it is possible that there is no true difference in the effectiveness of CBT interventions for males and females, and that the meta-analytic finding is a result

of the imbalance in gender composition of the primary studies (71% females and 29% males). Of the studies that reported on participant gender, only 6 had more men than women, contrasted to the 42 studies that had more women than men. Additionally, studies that compared active controls to CBT-BIs tended to have more males in their samples; these studies also yielded smaller effect sizes. Thus, the gender finding could be a statistical artifact in this meta-analysis.

A second explanation for the gender difference is that older males are less likely to participate in psychotherapeutic treatments. The reason for the higher dropout rate in studies with higher percentages of males cannot be determined from this meta-analysis. However, the results suggest that more attention needs to be given to the effectiveness of CBT-BIs with older males. Future research should investigate if older adult males require special clinical consideration to increase retention and treatment outcomes.

As a group, studies rated as having a higher quality had a smaller treatment effect than studies rated as lower quality. This finding could be a result of the type of analysis used in the primary studies; lower-quality studies were more likely to include data only from those who completed treatment, whereas higher-quality studies used intention-to-treat analyses. The other possibility is that the larger effect in the lower-quality studies was due to some unknown source of error. There was also a correlation between the quality of study scores and year of study publication; more recent studies were rated as higher quality. In terms of practical implications when using the research literature to inform treatment decisions, it is important for clinicians to evaluate the quality of the study. More recent studies, at least on this topic, appear to be of higher quality and thus are less prone to bias and overestimating treatment effects.

Summary of Clinical Implications

Results from this meta-analysis suggests that practitioners should consider CT as a first-line psychotherapeutic intervention for treating depressed older adults. CT's emphasis on identifying and modifying cognitive distortions (Beck, 1967, 1995), which is absent from more behaviourally based interventions (e.g., BT and BA), may be of particular benefit for alleviating depressive symptoms in older adults. CBT, PST, and BT also appear to be effective options for treating depression symptoms in this population. Presently, results suggest BA alone is not effective; however, it is important to note, there were fewer studies that evaluated this approach. An additional important finding was that CBT-BIs can be just as effective as antidepressant medication for older adults. Treatment gains made in CBT-BIs also appear to be more sustainable than treatment gains from other types of interventions.

Older adults who complete a full course of CBT-BI, receiving up to 20 sessions within 13 weeks, appear to be more likely to show a clinically significant decrease in depressive symptoms than those who drop out of treatment prematurely. Clinicians may need to give special attention to retaining older males in treatment. Previous research has shown that men across the lifespan tend to underutilize

health services and are more reluctant to ask for professional help than women (Addis & Mahalik, 2003; Johnson, 1988; Mansfield, Addis, & Mahalik, 2003). This could be particularly true for older men who adhere to more traditional masculine roles, although this proposition requires more research.

Booster sessions for depressed elderly people may also provide support with maintaining skills previously learned and aid in the prevention of depression relapse. The findings on age category suggest that older adults would likely benefit from receiving treatment for depression earlier rather than in their later years where cognitive and functional limitations may impede the treatment process. Lastly, treatment format may be negotiated between the setting and needs of the patient, as this did not appear to be a factor with treatment outcomes for CBT-BIs.

Limitations and Future Research

This meta-analysis study had several limitations that should be considered when interpreting the findings and clinical implications. Meta-analytic findings are always subject to the limitations of the primary studies. Most studies were conducted in North America. However, a few studies were conducted in non-Western settings (i.e., Chu, Yoo, & Lee, 2007; Hsu et al., 2010; Kitsumban, Thapinta, Sirindharo, & Anders, 2009) with encouraging results; nevertheless, it is premature to conclude that CBT-BIs are equally effective cross-culturally.

Overall, there were substantially more women than men across studies, which also limits the generalizability of findings. This could be a result of higher rates of depression among women (Cole & Dendukuri, 2003), or the reluctance of men to seek help for distress, as men have been found to be less likely to admit depressive symptoms (Sonnenberg, Beekman, Deeg, & van Tilburg, 2000). More research on factors that predict retention and outcome for older males in treatment for depression is needed.

It is also important to note that the magnitude of change documented in treatment studies may be larger than what is typically seen in clinical practice. Most studies analyzed completer-only data, which increased the risk of overestimating treatment effects (Newell, 1992). The manner in which treatments are implemented in clinical trials (e.g., weekly or twice-weekly sessions, closely following treatment protocols) may not be feasible in real-world settings. Furthermore, participants who meet inclusion criteria for treatment studies may not reflect those seen in private practice or community-based clinics. Other factors such as onset of depression (i.e., depressive symptoms before or after age 60) can influence posttreatment prognosis (Gallagher et al., 2010; Reynolds et al., 1998; Zisook et al., 2007). Unfortunately, too few studies reported data on age of depression onset to be included in the analyses.

CONCLUSION

This meta-analysis has shown that CBT-BIs are effective in improving depressive symptoms in late life. Numerous treatment manuals are available, and CBT-BIs

have been adapted to meet the unique needs of depressed older adults across treatment settings (Evans, 2007; Laidlaw & McAlpine, 2008; Laidlaw, Thompson, & Gallagher-Thompson, 2004). Given the utility and supporting evidence, CBT-BIs, with the tentative exception of BA, can be considered first-line interventions among established psychotherapeutic treatments for treating depression in late life.

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