Cognitive-behavioral therapy for adolescent depression: a meta-analytic investigation of changes in effect-size estimates

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CRD summary
The review concluded that the findings supported the effectiveness of cognitive-behavioural therapy (CBT) for depressed adolescents and that differences in estimates of efficacy may be due to methodological differences between early and more recent studies. The reliability of the authors' conclusions are uncertain as the potential for other confounding factors identified may be responsible for the differences in findings.

Authors' objectives
To evaluate the effectiveness of cognitive-behavioural therapy (CBT) for the treatment of adolescents with depression and to investigate changes in effect size estimates.

Searching
PsycINFO and MEDLINE databases were searched to 2006 for studies published in English. Search terms were reported. Reference lists of retrieved articles were scanned for additional studies.

Study selection
Randomised controlled trials (RCTs) that evaluated the effectiveness of CBT (defined in the paper) in comparison with an inactive control or alternative psychotherapy group were eligible for inclusion. Studies of participants aged between 12 and 18 years with diagnoses of depressive disorders based on DSM-III (Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition) or later, Research Diagnostic Criteria or Bellevue Index of Depression criteria were eligible for inclusion. Only published studies were eligible for inclusion.

In the included studies, CBT was compared to wait lists, conditions that controlled for non-specific aspects of treatment, active treatments that targeted non-depressive symptoms, active treatment for depression and a medication placebo. Interventions and controls were conducted as group or individual therapy in clinical and non-clinical settings. Follow up ranged from one month to 12 months. On average participants received 17.60 hours of therapy. Participants in the included studies were students, outpatients, children of outpatients and adolescents in the juvenile justice system. Mean age ranged from 12.7 to 16.2 years.

Three reviewers independently selected studies for inclusion. Disagreements were listed and referred for a second independent opinion.

Assessment of study quality
Validity was assessed and scored using the Consolidated Standard for Reporting Trials (CONSORT) rating system with a maximum possible score 22 points. It appeared that two reviewers independently assessed validity and any disagreements were resolved through discussion.

Data extraction
Data were assigned dichotomous ratings, which included whether they reported: individual or group treatment; samples of more or less than 37.3% males; participants who received treatment for depression outside each study or not; intention to treat analysis or not; treatment of more or less than 867 minutes; samples composed largely of students/community participants or outpatients/participants in a juvenile justice system; control active or inactive treatments for depression; clinical or non-clinical setting; more or less than 17 of 22 of the CONSORT criteria; treatment clinicians were used as clinicians or research assistants and/or graduate students; and severity estimates indicated more or less severe symptomatology than observed among participants in normative samples. When data from multiple follow-up assessment points were reported, data collected closest to six months post treatment were used to minimise differences in follow-up duration between studies.
Effect sizes and 95% confidence intervals (CIs) were calculated by dividing the post-therapy differences between CBT and control group means on measures of depression outcome by their pooled standard deviation based on methods by Hedges and Olkin, and applying Hedges' correction for small sample bias as necessary. For studies that included a wait-list control, effect sizes were computed by comparison of CBT and wait-list scores. For other comparisons, the effects of CBT were compared with those of the alternative active-control treatment hypothesised to have the least therapeutic effect. Effect sizes were weighted by the inverse of their variance. A single average effect size and weight for each trial was calculated for studies that included multiple depression measures.

Inter-rater reliability was evaluated and disagreements were resolved through discussion and reference to study details.

**Methods of synthesis**

Effect sizes of individual studies were combined using a random-effects model and a fixed-effect analysis. A series of cumulative random-effects meta-analyses were conducted to evaluate the efficacy and effectiveness of CBT over time, with steps defined by the publication date of each included study. Effect sizes were categorised as small (0.2), medium (0.5) and large (0.8). Analyses of variance (ANOVAs) were conducted to explore the effects of potential moderating variables. Retrospective power calculations were conducted using methods by Hedges and Pigott to determine if there was sufficient power to detect the effects of moderating variable. Publication bias was assessed using methods by Rosenthal and Orwin. Heterogeneity was assessed using the Q statistic.

**Results of the review**

Eleven RCTs (n=472) were included in the review. The CONSORT criteria met in the included studies ranged from 14 points to 21 points. Unfulfilled criteria related to sample size determination, methods used for random group assignment, blinding of investigators to group assignment and incidence of adverse events.

**Post-treatment efficacy (11 RCTs):**

The mean weighted post-treatment effect size in favour of CBT was moderate (effect size 0.53, standard deviation 0.15, 95% CI 0.24 to 0.82, p<0.01) when a random-effects analysis was used. There was no evidence of statistical heterogeneity.

**Follow-up effects (nine RCTs):**

The mean weighted follow-up effect size of CBT was moderate (effect size 0.59, standard deviation 0.23, 95% CI 0.14 to 1.05, p<0.01) when a random-effects analysis was used. There was no evidence of statistical heterogeneity.

The mean effect size for comparisons of CBT at follow up compared with control groups that used active treatments following the acute stage was 1.21 (standard deviation 0.12, 95% CI 0.97 to 1.45, p<0.01; three RCTs). Mean effect size for comparisons of CBT and control groups assessed concurrently at follow-up was not statistically significant (six RCTs).

**Moderator analyses:**

Several methodological variables moderated the post-treatment effects of CBT: not using an intention to treat analysis (p<0.05); comparison of CBT with inactive treatments for depression compared to studies that compared CBT with other active treatments or placebo (p<0.01); and studies that were conducted in a non-clinical setting compared to those conducted in clinical settings (p<0.05).

The authors stated that publication bias was unlikely to have affected their results (data not reported).

**Authors' conclusions**

Differences in estimates of efficacy of CBT for depressed adolescents may be due to methodological differences between early and more recent studies. Overall, the findings supported the effectiveness of CBT for the treatment of adolescents with depression.
CRD commentary
The review question was clear and supported by detailed inclusion criteria. Two databases were searched for studies published in English, which may have resulted in other relevant studies being missed. The authors assessed publication bias and reported that it was not present in the review, but the results were not reported. Methods were used to minimise reviewer errors and bias in the selection of studies, data extraction and assessment of validity. Validity was assessed using an established checklist; only the range of points scored was presented, which made it difficult for the reader to judge study validity. Statistical heterogeneity was assessed using appropriate methods. The authors’ conclusion that earlier, less methodologically rigorous studies might result in higher effect sizes was uncertain given that factors other than methodology may have been responsible for differences in findings between studies.

Implications of the review for practice and research
Practice: The authors stated that findings from the review provided some evidence that group or individual CBT may be effective for the treatment of depression among adolescents.

Research: The authors stated that further research was required to evaluate variables likely to mediate change, such as attributional styles, environmental reinforcement, problem solving, dysfunctional attitudes, assumption, social support, ruminative style, cognitive distortions and amelioration of stress. Future studies should consistently report on the type and amount of services received by participants following acute treatment to enable future investigators to statistically control for open treatment. Studies should contain detailed reporting of participant characteristics.

Funding
One author was supported by NIMH fellowship (F31MH075308).

Bibliographic details

PubMedID
18049290

DOI
10.1097/chi.0b013e3180592aaa

Original Paper URL
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2270481/

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Cognitive Therapy /methods; Depressive Disorder, Major /therapy; Humans; Treatment Outcome

AccessionNumber
12008005162

Date bibliographic record published
23/12/2008

Date abstract record published
04/11/2009

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.