

## Review article

# Computerised cognitive–behavioural therapy for depression: systematic review

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**Background**

Computerised cognitive–behavioural therapy (CCBT) is used for treating depression and provides a potentially useful alternative to therapist cognitive–behavioural therapy (CBT).

**Aims**

To systematically review the evidence for the effectiveness of CCBT for the treatment of mild to moderate depression.

**Method**

Electronic databases were searched to identify randomised controlled trials. Selected studies were quality assessed and data extracted by two reviewers.

**Results**

Four studies of three computer software packages met the inclusion criteria. Comparators were treatment as usual,

using a depression education website and an attention placebo.

**Conclusions**

There is some evidence to support the effectiveness of CCBT for the treatment of depression. However, all studies were associated with considerable drop-out rates and little evidence was presented regarding participants' preferences and the acceptability of the therapy. More research is needed to determine the place of CCBT in the potential range of treatment options offered to individuals with depression.

**Declaration of Interest**

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Depression and anxiety are common mental disorders usually treated within a primary care setting in the UK. Recognition of both disorders by general practitioners is often poor and the proportion of individuals who actually receive treatment is low.<sup>1</sup> Currently, medication is usually the first and often the only treatment offered, but is often associated with unwanted effects and is not cost-effective in those people with negative attitudes to taking medication.<sup>2</sup> There is substantial evidence to support the use of psychological therapies, particularly cognitive–behavioural therapy (CBT) in the treatment of depression and anxiety.<sup>3–5</sup> In common with all psychological therapies, there are considerable problems in the delivery of CBT in the UK, including too few therapists, expense associated with service costs, waiting lists and peoples' reluctance to enter therapy. Recently there have been suggestions that self-help strategies are useful tools for delivering psychological therapies.<sup>6</sup> Alternative delivery methods for CBT with less therapist involvement have been developed including computerised cognitive–behavioural therapy (CCBT). Although a variety of non-randomised uncontrolled studies of CCBT have been reported in the literature,<sup>7–9</sup> these studies are of poorer quality compared with randomised controlled trials and are potentially biased in favour of the treatment under investigation. This paper systematically reviews randomised controlled trials of CCBT software packages for the treatment of mild to moderate depression.

**Method**

The searches aimed to identify all references relating to the clinical effectiveness of CCBT for anxiety and depressive disorders, with particular emphasis on the literature published since the original National Institute for Health and Clinical Excellence (NICE) Guidance 51.<sup>10</sup> Fifteen electronic bibliographic databases were searched including Medline, Embase, Cochrane and PsycINFO, among others. Population search terms included 'depression AND anxiety' and were combined with intervention terms such

as 'cognitive therapy', 'behavio(u)r therapy', 'psychotherapy AND computer', 'computerised', 'internet', etc. These were supplemented with more specific searches on named packages.

In addition, the reference lists of relevant articles were checked and health services research-related resources such as Health Technology Assessment (HTA) organisations, guideline-producing bodies, generic research and trials registers, and specialist mental health sites were also searched. The search strategies and sources are described in detail elsewhere.<sup>9</sup> No date, language, study or publication type restrictions were applied.

We included studies of adults with mild to moderate depression, with or without anxiety, as defined by individual studies. The following disorders did not fall within the remit of this review: postnatal depression, bipolar disorder, depression with psychotic symptoms or current major depression or serious suicidal thoughts.

Cognitive–behavioural therapy was delivered alone or as part of a package of care either via a computer interface or over the telephone with a computer response. Comparators were current standard treatments including therapist-led CBT, non-directive counselling, primary care counselling, routine management (including drug treatment) and alternative methods of CBT delivery such as bibliotherapy and group CBT. Outcomes included improvement in psychological symptoms, interpersonal and social functioning, quality of life and participant satisfaction both with treatment and site of delivery. All randomised controlled trials (RCTs) meeting the inclusion/exclusion criteria were included.

Quality assessment for the trials was based on the Critical Appraisal Skills Programme<sup>11</sup> checklist for RCTs. All data from included studies was extracted by one reviewer and checked by a second using a standardised data extraction form.

We assessed studies on the basis of study design, populations, comparators and outcomes for synthesis. Due to heterogeneity in these components, we could not undertake formal statistical synthesis and the results are presented in tabulated format with a narrative synthesis of the results.

## Results

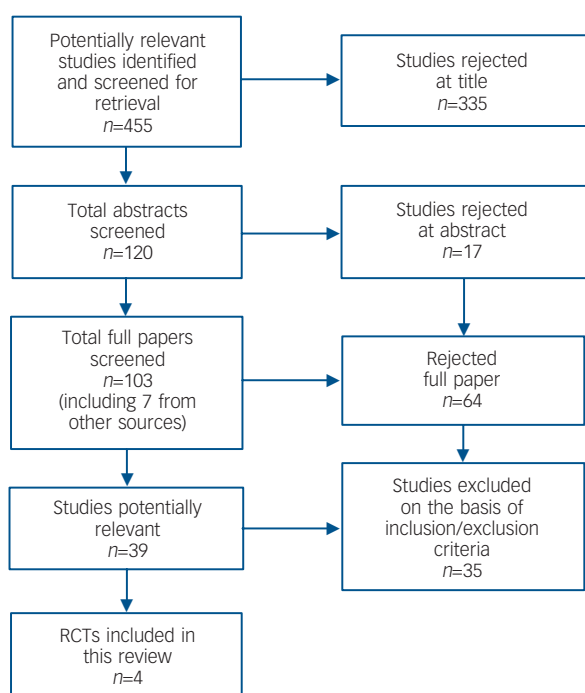
We screened 455 references and assessed the text of 103 full papers. Figure 1 summarises the study selection and exclusion process. Four studies met the inclusion criteria<sup>12–15</sup> and details of these studies are presented in online Table DS1. One RCT of Beating the Blues was identified comparing it with treatment as usual (TAU).<sup>12</sup> One study of MoodGYM had two comparators, a web-based information programme (BluePages) and attention placebo.<sup>13</sup> Two RCTs of Overcoming Depression on the Internet (ODIN) were identified, with usual care as the comparator.<sup>14,15</sup> One of these studies<sup>15</sup> compared two different forms of reminders (telephone or post) in the group receiving ODIN.

### Beating the Blues

Beating the Blues consists of a 15-min introductory video and eight 1-h interactive computer sessions using CBT strategies. Sessions are usually on a weekly basis and completed in the routine care setting (general practice). Homework projects are set and progress reports generated after each session (including reported suicidality). The amount of therapist time reported by Proudfoot *et al*<sup>12</sup> was up to a total of 80 min over the eight sessions for Beating the Blues.

### MoodGYM

MoodGYM is a web-based CBT programme for depression, developed in Australia. It consists of five interactive modules, which are made available sequentially on a week-by-week basis, with revision of all aspects of the programme in the sixth week. No therapist input was reported in the study identified,<sup>13</sup> but participants were phoned weekly to ascertain whether the site had been visited, to encourage repeat visits and homework completion.



**Fig. 1** Summary of study selection and exclusion. RCTs, randomised controlled trials.

### Overcoming Depression on the Internet

Overcoming Depression on the Internet, a US-based programme, uses cognitive restructuring techniques delivered over the internet in the form of self-guided interactive tutorials. The ODIN site is unattended, and there is no therapist involvement. However, participants in the telephone reminder group were phoned by study staff who had non-clinical backgrounds.<sup>15</sup> Participants were free to sign in and use the site as desired. In one study<sup>14</sup> the mean number of sessions was 2.6 (s.d.=3.5; range 1–20 sessions). Sessions were self-paced and the length of the sessions was not reported in either study. In the second study (with reminders by post or telephone) the mean number of sessions was 5.9 (s.d.=6.2; range 1–33 sessions) for reminders by post and 5.6 (s.d.=5.8; range 1–27 sessions) for reminders by telephone.<sup>15</sup>

### Study characteristics

All four studies had mostly female participants with mean age varying from 36.43 years (s.d.=9.4)<sup>13</sup> to 50.3 years (s.d.=10.8).<sup>15</sup> Methods for diagnosis of depression varied. Proudfoot *et al*<sup>12</sup> used the Programmable Questionnaire system<sup>16</sup> to diagnose depression, while Christensen *et al*<sup>13</sup> used the Kessler Psychological Distress Scale<sup>17</sup> and Clarke *et al*<sup>14,15</sup> identified participants who had received medical services in the previous 30 days with a recorded diagnosis of depression. Both ODIN studies included participants with and without depression.

### Study quality

The quality of the studies was moderate, as briefly described in online Table DS1. However, two studies reported no reasons for loss to follow-up<sup>14,15</sup> and none of the four studies used masked assessment of outcomes. Data on psychological outcomes and participant satisfaction for the four studies are presented in online Tables DS2–DS5.

### Psychological outcomes

The four studies used a variety of instruments to measure psychological outcomes, making comparison between the trials difficult. The Beating the Blues study<sup>12</sup> used the Beck Depression Inventory<sup>18</sup> as the primary outcome measure. Beating the Blues appeared to be more effective than TAU with regard to scores for depression.

In the MoodGYM study,<sup>13</sup> the Centre for Epidemiologic Studies Depression (CES-D) Scale<sup>19</sup> was used as the primary outcome measure. Mean improvement in symptoms was reported rather than pre- and post-treatment values. Both MoodGYM (CCBT) and BluePages (psychoeducation) delivered via the internet were more effective in reducing symptoms of depression than the control. The two ODIN trials also used CES-D as the primary outcome measure. In one of the ODIN studies,<sup>14</sup> ODIN was not effective in reducing symptoms of depression. In the other ODIN trial,<sup>15</sup> participants had a greater reduction on the CES-D than those in the TAU control group.

All four studies reported the use of an intention-to-treat analysis. However, Proudfoot *et al*<sup>12</sup> reported pre-treatment values only for 127 of the 146 randomised participants in the Beating the Blues group and for 114 of the 128 individuals in the TAU group making this not strictly speaking an intention-to-treat analysis.

### Participant satisfaction

The four studies gave some, although limited, information on participants' attitudes to treatment. Proudfoot *et al*<sup>12</sup> reported that individuals in the Beating the Blues group were significantly

more satisfied with treatment than those in the TAU group but no values were reported. Christensen *et al*<sup>13</sup> reported that peoples' acceptability of MoodGYM was implied by the low drop-out rates although no data were reported. No information regarding participants attitudes to treatment was reported for either ODIN trial.

### Drop-out rates

Drop-out rates varied between the studies. In the study comparing Beating the Blues with TAU,<sup>12</sup> of the 274 individuals initially randomised, 35% dropped out during the study. In the MoodGYM study,<sup>13</sup> 25.3% dropped out of the MoodGYM group, while 15% dropped out of the BluePages group and 10% from the attention placebo group. In the ODIN trials it is difficult to differentiate drop-out rates in the treatment group from the control groups as overall drop-out numbers are reported. In one ODIN trial, of the 299 participants initially randomised, 26% failed to complete at least one follow-up visit and by the 32-week follow-up the drop-out rate had reached 41%.<sup>14</sup> In the other ODIN study, 18% of the initial 255 participants failed to complete at least one follow-up assessment and at 16 weeks this had reached 34%.<sup>15</sup> These drop-out rates are comparable with those for other psychological therapies for depression.<sup>20</sup>

## Discussion

Four RCTs were identified in this systematic review of CCBT for treatment of mild to moderate depression, three of which show evidence of effectiveness. There is some evidence that Beating the Blues is more effective than treatment as usual for depression. Both MoodGYM (CCBT) and BluePages (psychoeducation) delivered via the internet were effective in reducing symptoms of depression. With regard to the ODIN studies, one study<sup>14</sup> reported no treatment effect for ODIN and low usage rates in the ODIN intervention group. In the second study,<sup>15</sup> intervention participants had a greater reduction in depression scores compared with the control group. There is limited evidence from all of the studies regarding the satisfaction of participants.

Although CCBT is a potentially useful intervention, the identified trials were of moderate quality and associated with several weaknesses. For example, comparisons between the packages are difficult owing to the use of different comparators and outcome measures, and different levels of severity at baseline. It is also difficult to ascertain the amount of therapist involvement needed by individuals using the programmes. There is a lack of independent studies, with most trials being conducted by those developing and promoting the products.

Implementation of programmes may be hindered by lack of information regarding recruitment. In most of the included studies the individuals were self-selected, in that they volunteered to take part in the study. In routine primary care, not all individuals may be willing to try CCBT. Little information was provided by Proudfoot *et al*<sup>12</sup> regarding the routine selection of participants in general practitioner surgeries.

### Methodological strengths and weaknesses

The studies reported in this systematic review are moderate quality RCTs, which by virtue of their design attempt to reduce potential biases. However, the studies used self-selected individuals and there is very little data on those who refused to participate or those who dropped out. By including only RCTs we may have missed important data from non-randomised comparative trials. Randomised controlled trial results can be supplemented by comparative outcome data from large patient-population

field trials to ascertain the extent to which results obtained in efficacy trials can be translated into clinically effective interventions within complex healthcare systems. Other limitations are that the session duration was not always specified as well as the method of participant selection and severity of depression-making comparisons between trials difficult. Any extension of these findings to other groups, including those with severe depression, must be made with caution.

### Areas for further research

Future trials should include appropriate comparators such as bibliotherapy or selective serotonin reuptake inhibitors and study design should incorporate qualitative data collection regarding individual preference and attitudes towards treatment. Information is also needed to determine why individuals drop out of treatment. Pragmatic trials of CCBT within a stepped care programme are also necessary.

Increasingly, CCBT is offered as part of a range of treatments for people with depression, especially where access to CBT is limited. However, there is no evidence to suggest that all those would wish to participate in treatment via a computer interface.

People with depression at present have relatively few treatment options. Computerised CBT potentially allows treatment to be offered to a far greater number of individuals than is currently possible and offers considerable savings in terms of therapist time to a subset of those with depression.

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