

# The efficacy of internet interventions for depression and anxiety disorders: a review of randomised controlled trials

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Over the past 10 years, there has been increasing interest in the use of the internet for the dissemination of interventions designed to prevent and treat mental disorders, including those targeted at anxiety disorders and depression. There can be little doubt that the potential of the internet to effect or facilitate the delivery of mental health interventions, both with and without practitioner guidance, is high. However, this potential will only be realised if such programs actually work and do no harm.

Since the emergence of the first internet programs for mental disorders, there have been several systematic or quasi-systematic reviews of the effectiveness of depression and anxiety internet interventions.<sup>1-10</sup> Three of these reviews focused specifically on randomised controlled trials (RCTs) of internet interventions. In particular, our 2006 review of RCTs of internet interventions for mental health and related disorders<sup>1</sup> and a subsequent 2007 update<sup>2</sup> identified 10 trials focusing either on depression (four trials) or anxiety (six trials). Two of the four depression trials and four of the six anxiety trials yielded evidence of reduced symptoms. Subsequently, Spek and colleagues conducted a quantitative meta-analysis of 12 published and in-press RCTs of internet-based cognitive behaviour therapy (CBT) for depression and anxiety, reporting mean effect sizes for these conditions of 0.32 and 0.96, respectively.<sup>9</sup>

Since the publication of these reviews, further RCTs of anxiety and depression internet interventions have been published. This review updates the current state of the evidence concerning the outcomes, nature, quality and growth of published RCTs of preventive and treatment internet interventions for anxiety and depressive disorders; and documents the current availability of effective interventions.

## METHODS

### Study selection criteria

We updated our previous reviews of internet interventions for mental health and related conditions<sup>1,2</sup> using the methodology described in the original article.<sup>1</sup> In particular,

## ABSTRACT

**Objective:** To review the outcomes, nature and quality of published randomised controlled trials of preventive and treatment internet interventions for depression and anxiety disorders, and to document the availability of effective interventions.

**Data sources:** Previous reviews of internet interventions for mental health and related conditions were updated using an extension of the original methodology. All studies included in the original reviews and more recent eligible trials (published before June 2009) were included, together with any trials identified from a search of the health intervention web portal Beacon and the *Journal of Medical Internet Research*.

**Study selection:** A total of 29 reports describing 26 trials satisfied the inclusion criteria.

**Data synthesis:** All trials employed a cognitive behaviour therapy intervention program. Of the 26 trials, 23 demonstrated some evidence of effectiveness relative to controls. Effect size differences ranged from 0.42 to 0.65 for depression interventions involving participants with clinically significant symptoms of depression, and 0.29 to 1.74 for anxiety interventions involving participants with a diagnosed anxiety disorder. Of the five effective English-language programs, three are available to the public without charge and two can be accessed at a small cost through health practitioner referral.

**Conclusion:** Internet interventions for depression and anxiety disorders offer promise for use as self-help applications for consumers or as an adjunct to usual care.

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recent eligible trials were identified by searching the PubMed, PsycINFO and Cochrane Central Register of Controlled Trials databases using the two key search terms ("Internet" OR "Web") for the period since the last search.<sup>2</sup> However, the most recent PubMed search was limited to "randomized controlled trials", and a methodological search filter<sup>11</sup> was used to focus the PsycINFO search on randomised controlled trials.

Studies were included only if they: (i) involved a self-help website intervention or a website intervention that incorporated a self-help component; (ii) described the website application as targeting a depression or anxiety condition; (iii) tested the efficacy or effectiveness of the intervention; (iv) incorporated a measure of symptom outcome for the targeted condition; (v) employed an RCT design; (vi) included a control group that was not subjected to an active intervention such as a behavioural or cognitive therapy intervention, peer-to-peer forum or medication; and (vii) had been peer-reviewed and published. Dissertations and posters were excluded. Studies involving the guided delivery of a self-help intervention or in which the intervention was partly delivered by a therapist were included. All eligible reports from our original reviews<sup>1,2</sup> and

those of more recent eligible trials (collected in two waves, in February 2009 and mid June 2009) were included, together with any additional relevant trials identified by a search of the health intervention web portal Beacon (see Christensen et al, *page S40*),<sup>12</sup> a search of the contents of the *Journal of Medical Internet Research* and our personal knowledge of the field.

### Risk of study bias assessment

Each eligible paper was independently rated by KMG and a research assistant on three items of the Cochrane Collaboration's tool for assessing risk of bias:<sup>13</sup> sequence generation (Did the study employ an appropriate randomisation process? Yes, No, Unclear); allocation concealment (Did the study use an appropriate method of concealing the allocation of participants to conditions? Yes, No, Unclear); and incomplete outcome data (Were incomplete outcome data adequately addressed? Yes, No, Unclear).

### Analyses

An effect size difference (ESD) was recorded or calculated for each study. The ESD was calculated by subtracting the Cohen's *d* within effect size for the control group from

the equivalent within effect size for the intervention group. The within effect size for each group was calculated by subtracting the mean post-intervention outcome score for the group from the mean baseline outcome score and dividing by the pooled standard deviation of the baseline and post-intervention outcome scores. Where a study reported more than one primary outcome measure, the ESD was based on the measure most frequently used for the target condition by the body of studies included in this review. Given the heterogeneity and potential confounding across studies, systematic quantitative meta-analyses were not conducted.

## RESULTS

Box 1 shows that the number of new RCTs of efficacy or effectiveness of depression and anxiety internet interventions has increased approximately linearly over time, since the first trials appeared in the literature in 2001.

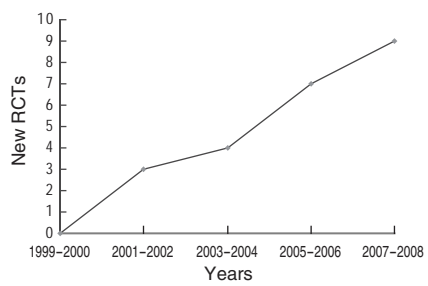
### Characteristics of studies

Twenty-six trials (described in 29 reports) satisfied the inclusion criteria.<sup>14-42</sup> Of these, eight targeted depression, 16 targeted an anxiety disorder (panic disorder, 5; social phobia, 5; post-traumatic stress disorder, 4; unspecified anxiety disorder, 2), and two studies targeted both depression and anxiety (Box 2, pages S8–S11). All trials employed a CBT intervention program (or a component of CBT<sup>41</sup>), with program durations ranging from 1 to 13 weeks. One trial also included an evidence-based depression education intervention.<sup>14</sup>

Two of the eight depression trials and almost all of the anxiety trials employed some level of therapist input, with two of the anxiety trials incorporating a face-to-face component.<sup>25,32</sup> Mean therapist time per participant ranged from 90 to 376 minutes across studies (median, 155 minutes).

Twenty-three of the 26 trials were community-based, with one based in a clinic<sup>25</sup> and two undertaken in the context of a health maintenance organisation in the United States.<sup>23,24</sup> None of the studies were undertaken in a general practice setting. Most of the samples involved adults with a mean age in the range of 30–50 years. Only one trial targeted an older sample,<sup>17,18</sup> and two trials involved children or adolescents.<sup>25,26</sup> None of the studies investigated outcomes for rural participants, although one specifically recruited both rural and city participants.<sup>27</sup> Sample sizes ranged from 23

### 1 Growth in randomised controlled trials (RCTs) of the efficacy or effectiveness of depression and anxiety internet interventions



to 786. The median sample size was 300 for depression, and 32, 73 and 66 for panic disorder, social phobia and post-traumatic stress disorder, respectively. Only two of the trials employed longer-term follow-up (at least 6 months) involving a randomised controlled design.<sup>16,18</sup>

Of the 26 trials, 19, 9 and 17 were rated low-risk for bias in the sequence generation, allocation concealment and incomplete data domains, respectively. Risk of bias was greater in the anxiety trials, with four of the eight depression trials but only one of the 16 anxiety trials rated low-risk for all three domains (Fisher exact test,  $P = 0.03$ ).

Most of the studies employed an intention-to-treat design. However, recruitment methods varied across studies, as did criteria for study inclusion. Some studies only included participants with a formal diagnosis of a depressive or anxiety disorder, while others selected participants on the basis of a clinically significant cut-off score on a self-report measure. Others selected people with elevated but not necessarily clinically significant levels of symptoms, and one study employed a sample of participants with subthreshold depression, specifically excluding those with a diagnosis of depressive disorder.<sup>17</sup> Finally, some studies recruited those who self-selected as requiring self-help.

Studies varied with respect to their control groups, with the majority employing the least conservative wait-list control, three using “treatment as usual” controls, one an attention placebo, and six a passive psychoeducational (information) control.

### Effectiveness

Box 2 summarises the outcomes for short- and long-term follow-up, including the short-term ESDs, for each study. Of the 26 trials, 23 demonstrated some evidence of

effectiveness. The two trials that investigated long-term effectiveness using an RCT design reported that the interventions were effective over the long term.<sup>16,18</sup>

### Depression

Six of the eight trials targeting depression yielded positive effects for CBT. One also demonstrated evidence of efficacy for an evidence-based depression information internet site relative to an attention control,<sup>14</sup> suggesting that passive psychoeducational information may be an effective intervention for depression. As a consequence, trials in Box 2 were separated on the basis of whether they employed a psychoeducational control condition. All five depression trials that used a wait-list, treatment-as-usual or attention placebo control group were effective in both the short term and, for the two RCTs that investigated it, the long term. Of the three trials that exposed the control group to psychoeducational information about depression, one, which employed reminders and involved minimal information, was effective.

ESDs for the CBT programs not employing psychoeducational controls varied across studies: 0.30 to 0.53 for prevention or quasi-prevention trials (targeting participants with elevated depressive symptoms who either had no depressive disorder or who had not been selected on the basis of depressive disorder); 0.42 to 0.65 for participants with clinically significant symptoms; and 0.65 for a trial that employed categorical diagnostic criteria.

### Anxiety

All of the anxiety interventions yielded positive results on at least one measure, regardless of the type of control group they employed, except for the non-therapist arm of one social phobia study.<sup>36</sup> With this exception, all the anxiety programs without psychoeducational controls employed diagnostic criteria or therapist input and, in most cases, both. The ESDs of all anxiety programs ranged from 0.29 to 1.74, with most exceeding 0.65.

### Availability of effective English-language programs

Only five of the programs included in this review are available in the English language. Of the English-language programs, three depression applications are currently publicly accessible on the web without charge to consumers (ODIN,<sup>23,24</sup> MoodGYM and BluePages;<sup>14-16</sup> see Bennett et al, page S48).<sup>43</sup> A fourth depression program (Sadness<sup>20</sup>)

and a social phobia program (Shyness<sup>34-36</sup>) are available under restricted licence at a small cost (see Andrews and Titov, page S45).<sup>44</sup> With the exception of ODIN, each of these English-language programs was developed in Australia and is supported by evidence from additional intervention studies not reported here.

## DISCUSSION

The findings of this review clearly demonstrate that the internet can be an effective medium for the delivery of interventions designed to reduce the symptoms of depression and anxiety conditions. Moreover, the effect sizes for the depression trials, both with and without therapist input, were at least as large as the standardised effect sizes relative to controls reported in recent meta-analyses of psychological treatment in primary care (0.31)<sup>45</sup> and antidepressant treatment of depression (0.37).<sup>46</sup> Similarly, the anxiety effect sizes reported here are consistent with controlled effect sizes reported for face-to-face treatment of panic disorder<sup>47,48</sup> and social phobia.<sup>49</sup>

Based on the current available data, it is not possible to reliably draw conclusions about the factors that predict better outcomes. The effect sizes for anxiety trials appear larger than those for depression trials, but participants in the former trials were more often self-selected volunteers and were typically only included in the trial if they also satisfied diagnostic criteria at screening. In addition, as noted in a previous review,<sup>9</sup> participants in the anxiety trials were more likely to receive therapeutic input in addition to the internet self-help program. Moreover, a greater proportion of the anxiety trials employed less conservative wait-list control designs, and the potential for study bias was greater in the anxiety trials.

A question of considerable practical and policy importance is whether internet programs yield better results if they include input from therapists or lay facilitators, or email reminders. Previous reviews have reported greater effect sizes for internet<sup>9</sup> and other self-help programs<sup>50</sup> when the intervention incorporated therapist assistance. However, the latter meta-analysis found no clear advantage of therapeutic support compared with simple monitoring.<sup>50</sup> The findings from our review and other trials<sup>51</sup> suggest that internet programs can be effective without therapist input. However, due to the variation in the methodologies of the studies reviewed, such as participant and control group characteristics, it was not

possible to evaluate the effect of the presence, type or intensity of guidance by comparing effect sizes across studies.

One of the reviewed studies did directly compare self-guided with therapist-guided delivery of a program,<sup>36</sup> finding superior outcomes for the latter. In this study, participants with social phobia received a 6-week, web-based, self-help CBT program and chat group, or the same intervention with the addition of email contact with a therapist (requiring an average of 2.5 hours of therapist time per participant). Unfortunately, the study did not include a condition involving an equivalent degree of guidance from a lay facilitator or the use of an automated ongoing email reminder system. Including these conditions would have assisted in determining the effect of substituting automated reminders or trained lay facilitators for trained therapists in delivering these programs. Moreover, it is not known how much guidance is optimal. A recent study reported no advantage of substantial therapist input compared with minimal therapist input.<sup>52</sup>

One study recently reported that an internet program for panic disorder was as effective when administered by general practitioners as by clinical psychologists.<sup>53</sup> However, a methodological weakness of the study was that the participants seen by the GPs were recruited from a primary care setting, whereas those seen by the psychologists were not. Moreover, since the GPs involved had received mental health training, the result may not be generalisable to GPs without such training.

Well controlled studies are required to investigate the relative efficacy of automated reminder systems compared with human guidance, the relationship between outcomes and training, and the extent to which time spent facilitating self-help determines outcomes. In addition, there is a need to investigate whether internet mental health interventions work equally well for different individuals and groups and in different settings. In our original review, we found no trials involving rural residents, older people or children and adolescents.<sup>1</sup> Little has changed, with none of the studies reviewed here targeting older adolescents, rural residents, or people with low educational backgrounds, and only one trial targeting older people. There is still much that we do not know.

What we do know is that many people who might benefit from conventional face-to-face psychological treatment or preven-

tive intervention will not receive it, either by preference or because of geographical or mobility barriers or a shortage of trained therapists.<sup>54-57</sup> In such circumstances, it is justified for a health care provider to prescribe an internet intervention that has been shown in community trials to have efficacy at least equivalent to that resulting from treatment as usual in primary care; and self-referral of a consumer to a self-help internet service of demonstrated efficacy is similarly justified.

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## COMPETING INTERESTS

Kathleen Griffiths and Helen Christensen are coauthors of several depression internet programs, including MoodGYM and BluePages.

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## REFERENCES

- 1 Griffiths KM, Christensen H. Review of randomised controlled trials of Internet interventions for mental disorders and related conditions. *Clin Psychol* 2006; 10: 16-29.
- 2 Griffiths K, Farrer L, Christensen H. Clickety-click: e-mental health train on track. *Australas Psychiatry* 2007; 15: 100-108.
- 3 Ybarra ML, Eaton WW. Internet-based mental health interventions. *Ment Health Serv Res* 2005; 7: 75-87.
- 4 Postel MG, de Haan HA, De Jong CA. E-therapy for mental health problems: a systematic review. *Telemed J E Health* 2008; 14: 707-714.
- 5 Bee PE, Bower P, Lovell K, et al. Psychotherapy mediated by remote communication technologies: a meta-analytic review. *BMC Psychiatry* 2008; 8: 60.
- 6 Mataix-Cols D, Marks IM. Self-help with minimal therapist contact for obsessive-compulsive disorder: a review. *Eur Psychiatry* 2006; 21: 75-80.
- 7 Kaltenthaler E, Brazier J, De Nigris E, et al. Computerised cognitive behaviour therapy for depression and anxiety update: a systematic review and economic evaluation. *Health Technol Assess* 2006; 10 (33): 1-168.

- 8 Hailey D, Roine R, Ohinmaa A. The effectiveness of telemental health applications: a review. *Can J Psychiatry* 2008; 53: 769-778.
- 9 Spek V, Cuijpers P, Nyklicek I, et al. Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: a meta-analysis. *Psychol Med* 2007; 37: 319-328.
- 10 Andersson G. Internet-based cognitive-behavioural self help for depression. *Expert Rev Neurother* 2006; 6: 1637-1642.
- 11 Weightman AL, Mann MK, Sander L, Turley RL. A systematic approach to identifying the evidence. Project Methodology 5. Health Evidence Bulletins Wales. Cardiff: Information Services, University of Wales College of Medicine, 2004.
- 12 Christensen H, Murray K, Calear AL, et al. Beacon: a web portal listing high-quality mental health websites for use by health professionals and the public. *Med J Aust* 2010; 192 (11 Suppl): S40-S44.
- 13 Higgins JPT, Altman DG, editors. Chapter 8: Assessing risk of bias in included studies. In: Higgins JPT, Green S, editors. *Cochrane handbook for systematic reviews of interventions*. Version 5.0.1 (updated Sep 2008). The Cochrane Collaboration, 2008. <http://www.cochrane-handbook.org> (accessed Oct 2009).
- 14 Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: randomised controlled trial. *BMJ* 2004; 328: 265-270.
- 15 Griffiths KM, Christensen H, Jorm AF, et al. Effect of web-based depression literacy and cognitive-behavioural therapy interventions on stigmatising attitudes to depression: randomised controlled trial. *Br J Psychiatry* 2004; 185: 342-349.
- 16 Mackinnon A, Griffiths KM, Christensen H. Comparative randomised trial of online cognitive-behavioural therapy and an information website for depression: 12-month outcomes. *Br J Psychiatry* 2008; 192: 130-134.
- 17 Spek V, Nyklicek I, Smits N, et al. Internet-based cognitive behavioural therapy for subthreshold depression in people over 50 years old: a randomized controlled clinical trial. *Psychol Med* 2007; 37: 1797-1806.
- 18 Spek V, Cuijpers P, Nyklicek I, et al. One-year follow-up results of a randomized controlled clinical trial on internet-based cognitive behavioural therapy for subthreshold depression in people over 50 years. *Psychol Med* 2008; 38: 635-639.
- 19 Warmerdam L, van Straten A, Twisk J, et al. Internet-based treatment for adults with depressive symptoms: randomized controlled trial. *J Med Internet Res* 2008; 10 (4): e44.
- 20 Perini S, Titov N, Andrews G. Clinician-assisted Internet-based treatment is effective for depression: randomized controlled trial. *Aust N Z J Psychiatry* 2009; 43: 571-578.
- 21 Meyer B, Berger T, Caspar F, et al. Effectiveness of a novel integrative online treatment for depression (Deprexis): randomized controlled trial. *J Med Internet Res* 2009; 11 (2): e15.
- 22 Patten SB. Prevention of depressive symptoms through the use of distance technologies. *Psychiatr Serv* 2003; 54: 396-398.
- 23 Clarke G, Reid E, Eubanks D, et al. Overcoming Depression on the Internet (ODIN): a randomized controlled trial of an Internet depression skills intervention program. *J Med Internet Res* 2002; 4 (3): e14.
- 24 Clarke G, Eubanks D, Reid E, et al. Overcoming Depression on the Internet (ODIN) (2): a randomized trial of a self-help depression skills program with reminders. *J Med Internet Res* 2005; 7 (2): e16.
- 25 Spence SH, Holmes JM, March S, Lipp OV. The feasibility and outcome of clinic plus internet delivery of cognitive-behavior therapy for childhood anxiety. *J Consult Clin Psychol* 2006; 74: 614-621.
- 26 March S, Spence SH, Donovan CL. The efficacy of an internet-based cognitive-behavioral therapy intervention for child anxiety disorders. *J Pediatr Psychol* 2009; 34: 474-487.
- 27 Klein B, Richards JC. A brief internet-based treatment for panic disorder. *Behav Cogn Psychother* 2001; 29: 113-117.
- 28 Carlbring P, Westling BE, Ljungstrand P, et al. Treatment of panic disorder via the internet: a randomized trial of a self-help program. *Behav Ther* 2001; 32: 751-764.
- 29 Carlbring P, Bohman S, Brunt S, et al. Remote treatment of panic disorder: a randomized trial of internet-based cognitive behavior therapy supplemented with telephone calls. *Am J Psychiatry* 2006; 163: 2119-2125.
- 30 Klein B, Richards JC, Austin DW. Efficacy of internet therapy for panic disorder. *J Behav Ther Exp Psychiatry* 2006; 37: 213-238.
- 31 Richards JC, Klein B, Austin DW. Internet cognitive behavioural therapy for panic disorder: does the inclusion of stress management information improve end-state functioning? *Clin Psychol* 2006; 10: 2-15.
- 32 Andersson G, Carlbring P, Holmström A, et al. Internet-based self-help with therapist feedback and in vivo group exposure for social phobia: a randomized controlled trial. *J Consult Clin Psychol* 2006; 74: 677-686.
- 33 Carlbring P, Gunnarsdottir M, Hedensjö L, et al. Treatment of social phobia: randomised trial of internet-delivered cognitive-behavioural therapy with telephone support. *Br J Psychiatry* 2007; 190: 123-128.
- 34 Titov N, Andrews G, Schwencke G, et al. Shyness 1: distance treatment of social phobia over the Internet. *Aust N Z J Psychiatry* 2008; 42: 585-594.
- 35 Titov N, Andrews G, Schwencke G. Shyness 2: treating social phobia online: replication and extension. *Aust N Z J Psychiatry* 2008; 42: 595-605.
- 36 Titov N, Andrews G, Choi I, et al. Shyness 3: randomized controlled trial of guided versus unguided Internet-based CBT for social phobia. *Aust N Z J Psychiatry* 2008; 42: 1030-1040.
- 37 Lange A, Rietdijk D, Hudcovicova M, et al. Interapy: a controlled randomized trial of the standardized treatment of posttraumatic stress through the internet. *J Consult Clin Psychol* 2003; 71: 901-909.
- 38 Hirai M, Clum GA. An Internet-based self-change program for traumatic event related fear, distress, and maladaptive coping. *J Trauma Stress* 2005; 18: 631-636.
- 39 Knaevelsrud C, Maercker A. Internet-based treatment for PTSD reduces distress and facilitates the development of a strong therapeutic alliance: a randomized controlled clinical trial. *BMC Psychiatry* 2007; 7: 13-22.
- 40 Lange A, van de Ven JP, Schrieken B, Emmelkamp PM. Interapy, treatment of post-traumatic stress through the internet: a controlled trial. *J Behav Ther Exp Psychiatry* 2001; 32: 73-90.
- 41 van Straten A, Cuijpers P, Smits N. Effectiveness of a web-based self-help intervention for symptoms of depression, anxiety and stress: randomized controlled trial. *J Med Internet Res* 2008; 10 (1): e7.
- 42 Billings DW, Cook RF, Hendrickson A, Dove DC. A web-based approach to managing stress and mood disorders in the workforce. *J Occup Environ Med* 2008; 50: 960-968.
- 43 Bennett K, Reynolds J, Christensen H, Griffiths KM. e-hub: an online self-help mental health service in the community. *Med J Aust* 2010; 192 (11 Suppl): S48-S52.
- 44 Andrews G, Titov N. Is internet treatment for depressive and anxiety disorders ready for prime time? *Med J Aust* 2010; 192 (11 Suppl): S45-S47.
- 45 Cuijpers P, van Straten A, Warmerdam L, Andersson G. Psychological treatment of depression: a meta-analytic database of randomized studies. *BMC Psychiatry* 2008; 8: 36.
- 46 Turner EH, Matthews AM, Linardatos E, et al. Selective publication of antidepressant trials and its influence on apparent efficacy. *N Engl J Med* 2008; 358: 252-260.
- 47 Haby MM, Donnelly M, Corry J, Vos T. Cognitive behavioural therapy for depression, panic disorder and generalized anxiety disorder: a meta-regression of factors that may predict outcome. *Aust N Z J Psychiatry* 2006; 40: 9-19.
- 48 Kiroopoulos LA, Klein B, Austin DW, et al. Is internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT? *J Anxiety Disord* 2008; 22: 1273-1284.
- 49 Acarturk C, Cuijpers P, van Straten A, de Graaf R. Psychological treatment of social anxiety disorder: a meta-analysis. *Psychol Med* 2009; 39: 241-254.
- 50 Gellatly J, Bower P, Hennessy S, et al. What makes self-help interventions effective in the management of depressive symptoms? Meta-analysis and meta-regression. *Psychol Med* 2007; 37: 1217-1228.
- 51 Christensen H, Griffiths KM, Mackinnon AJ, Brittlieff K. Online randomized controlled trial of brief and full cognitive behaviour therapy for depression. *Psychol Med* 2006; 36: 1737-1746.
- 52 Klein B, Austin D, Pier C, et al. Internet-based treatment for panic disorder: does frequency of the therapist contact make a difference? *Cogn Behav Ther* 2009; 38: 100-113.
- 53 Shandley K, Austin DW, Klein B, et al. Therapist-assisted, Internet-based treatment for panic disorder: can general practitioners achieve comparable patient outcomes to psychologists? *J Med Internet Res* 2008; 10 (2): e14.
- 54 Shapiro DA, Cavanagh K, Lomas H. Geographic inequity in the availability of cognitive behavioural therapy in England and Wales. *Behav Cogn Psychother* 2003; 31: 185-192.
- 55 Andrews G, Issakidis C, Carter G. Shortfall in mental health service utilisation. *Br J Psychiatry* 2001; 179: 417-425.
- 56 Lowe S, O'Kane A. National allied health workforce report. Canberra: Services for Australian Rural and Remote Allied Health, 2004.
- 57 Australian Institute of Health and Welfare. Rural, regional and remote health: Indicators of health. Canberra: AIHW, 2005. (AIHW Cat. No. PHE 59.)

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2 Summary of randomised controlled trials (RCTs) of internet intervention programs targeted at (i) depression, (ii) anxiety and (iii) both depression and anxiety

(i) Depression interventions

Study (first author), year	Program		Human input		Participants		ITT analysis	Effective overall	Short-term follow-up			Follow-up	Long-term RCT follow-up	
	Type	Length (weeks)	Therapist/duration*	Reminder No.†	Setting; recruitment method; age	No.†			Group or subgroup	Effect size (ES) difference‡	Within ES for control			Effective
<i>Comparison to wait-list control, treatment as usual, or attention placebo control</i>														
Christensen, 2004 <sup>14</sup>	CBT	5	AC	No	Yes	525	Community; electoral roll; aged 18–50 years	Yes	Yes	Prev	0.30 <sup>ITT,CES-D</sup>	0.1 <sup>ITT</sup>	12 months	Yes <sup>ITT</sup>
Griffiths, 2004 <sup>15</sup>										Prev	0.50 <sup>C,CES-D</sup>	0.1 <sup>C</sup>		
Mackinnon, 2008 <sup>16</sup>										CSD	0.65 <sup>C,CES-D</sup>	0.25 <sup>C</sup>		
	E-INF	5	AC	No	Yes			Yes	Yes	Prev	0.30 <sup>ITT,CES-D</sup>	0.1 <sup>ITT</sup>	12 months	Yes <sup>ITT</sup>
Spek, 2007 <sup>17</sup>	CBT	10	WLC	No	No	301	Community; media and all citizens of city born 1949–1955; aged 50–75 years	Yes	Yes	Prev	0.53 <sup>ITT,BDI</sup>	0.45 <sup>ITT</sup>	12 months	Yes <sup>ITT</sup>
Spek, 2008 <sup>18</sup>														
Warmerdam, 2008 <sup>19</sup>	CBT	8	WLC	Yes/160	Yes	263	Community; general media and mental health websites; mean age, 45 years	Yes	Yes	SS/CSD	0.42 <sup>ITT,CES-D</sup>	0.72 <sup>ITT</sup>	No	—
	PS	5	WLC	Yes/100	Yes				Yes	SS/CSD	0.48 <sup>ITT,CES-D</sup>	0.62 <sup>ITT</sup>	No	—
Perini, 2009 <sup>20</sup>	CBT	8	WLC	Yes/111	Yes	48	Community; visitors to mental health website; mean age, 49.2 years	Yes	Yes	SS/Dx	0.65 <sup>ITT,BDI</sup>	0.50 <sup>ITT</sup>	No	—
Meyer, 2009 <sup>21</sup>	CBT	9	WLC + TAU	No	No	396	Community; visitors to depression forums; mean age, 34.7 years	Yes	Yes	SS	0.29 <sup>ITT,BDI</sup>	0.0 <sup>ITT</sup>	No	—
										SS	0.57 <sup>C</sup>	0.01 <sup>C</sup>		
<i>Comparison to psychoeducational control</i>														
Patten, 2003 <sup>22</sup>	CBT	nr	PE	No	No	786	Community; media; mean age, 45.2 years	No	No	SS for Prev	na	na	No	—
Clarke, 2002 <sup>23</sup>	CBT	nr	TAU + PE	No	No	299	Health maintenance organisation (HMO); mean age, 43.8 years	Yes	No	Dx+SS	0.21 <sup>ITT,CES-D\$</sup>	0.40 <sup>ITT</sup>	32 weeks	No
										SS	0.13 <sup>ITT,CES-D\$</sup>	0.46 <sup>ITT</sup>		
										Dx	0.24 <sup>ITT,CES-D\$</sup>	0.37 <sup>ITT</sup>		
										CSD	0.44 <sup>ITT,CES-D\$</sup>	0.39 <sup>ITT</sup>		
Clarke, 2005 <sup>24</sup>	CBT + mail rem	nr	TAU + PE	No	Yes	255	HMO; mean age, 46.5 years	Yes	Yes <sup>¶</sup>	Dx+SS	0.32 <sup>ITT,CES-D\$</sup>	0.3 <sup>ITT</sup>	No	—
										Dx	0.24 <sup>ITT,CES-D\$</sup>	0.25 <sup>ITT</sup>		
										CSD	0.25 <sup>ITT,CES-D\$</sup>	0.69 <sup>ITT</sup>		
	CBT + phone rem	nr	TAU + PE	No	Yes			Yes <sup>¶</sup>	Yes <sup>¶</sup>	Dx+SS	0.06 <sup>ITT,CES-D\$</sup>	0.3 <sup>ITT</sup>	No	—
										Dx	0.38 <sup>ITT,CES-D\$</sup>	0.25 <sup>ITT</sup>		
										CSD	-0.1 <sup>ITT,CES-D\$</sup>	0.69 <sup>ITT</sup>		

2 Summary of randomised controlled trials (RCTs) of internet intervention programs targeted at (i) depression, (ii) anxiety and (iii) both depression and anxiety (continued)

(ii) Anxiety interventions

Study (first author), year	Program		Human input		Participants Setting; recruitment method; age	ITT analysis	Short-term follow-up		Long-term RCT follow-up					
	Type	Length (weeks)	Therapist/duration*	Reminder			No.†	Effective overall		Group or subgroup	Effect size (ES) difference‡	Within ES for control		
<b>Anxiety disorder (unspecified)</b>														
<i>Comparison to wait-list control, treatment as usual, or attention placebo control</i>														
Spence, 2006 <sup>25</sup>	CBT	10	WLC	Yes <sup>F</sup> /300	na	309	Psychology clinic; referral from mental health clinics and school counsellors; aged 7–14 years	Yes	Yes (DS)	Dx	0.35 <sup>C,SCAS-C§</sup> 1.46 <sup>C,DS</sup>	0.38 <sup>C,SCAS-C§</sup> 0.55 <sup>C,DS</sup>	No	—
March, 2009 <sup>26</sup>	CBT	10	WLC	Yes/nr	na	72	Community; referral by parents, teachers, mental health professionals; aged 7–12 years	Yes	Yes (DS)	Dx	0.35 <sup>C,SCAS-C§</sup> 0.86 <sup>C,DS</sup>	0.56 <sup>C,SCAS-C</sup> 0.63 <sup>C,DS</sup>	No	—

**Panic disorder**

*Comparison to wait-list control, treatment as usual, or attention placebo control*

Klein, 2001 <sup>27</sup>	CBT	1	SM	Technical only	Yes	23	Community (rural and city); unclear; mean age, 43.0 years	No	Yes	Dx	na	na	No	—
Carlbriing, 2001 <sup>28</sup>	CBT	7–12	WLC	Yes/90	Yes	31	Community; print media and panic disorder website; mean age, 34.0 years	Yes	Yes	SS/Dx	0.62 <sup>ITT,pi§</sup>	-0.03 <sup>ITT</sup>	No	—
Carlbriing, 2006 <sup>29</sup>	CBT	10	WLC	Yes/114	Yes	60	Community; print media and panic disorder website; mean age, 36.7 years	Yes	Yes	SS/Dx	1.0 <sup>ITT,Mi§</sup>	0.0 <sup>ITT</sup>	No	—
<b>Comparison to psychoeducational control</b>														
Klein, 2006 <sup>30</sup>	CBT	6	PE/WLC	Yes/333	Yes	55	Community; panic and other mental health websites, general media; aged 18–70 years	Yes	Yes	SS/Dx	0.81 <sup>ITT,pi†</sup>	-0.15 <sup>ITT</sup>	No	—
Richards, 2006 <sup>31</sup>	CBT	8	PE + SM/WLC	Yes/376	Yes	32	Community; panic and other mental health websites, general media; mean age, 37.4 years	Yes	Yes	SS/Dx	0.88 <sup>ITT,pi§</sup>	-0.60 <sup>ITT</sup>	No	—
CBT + StressM	8	PE + SM/WLC	Yes/309	Yes			Community; panic and other mental health websites, general media; mean age, 31.9 years	Yes	Yes	SS/Dx	1.74 <sup>ITT,pi§</sup>	-0.60 <sup>ITT</sup>	No	—

**2 Summary of randomised controlled trials (RCTs) of internet intervention programs targeted at (i) depression, (ii) anxiety and (iii) both depression and anxiety (continued)**

**(ii) Anxiety interventions (continued)**

Study (first author), year	Program		Human input		Participants Setting; recruitment method; age	ITT analysis	Short-term follow-up		Long-term RCT follow-up					
	Type	Length (weeks)	Therapist/duration*	Reminder			No.†	Effective overall		Group or subgroup difference*	Within ES for control			
<b>Social phobia</b>														
<i>Comparison to wait-list control, treatment as usual, or attention placebo control</i>														
Andersson, 2006 <sup>32</sup>	CBT	9	WLC	Yes <sup>F</sup> /180	Unclear	64	Community; media and national anxiety website; mean age, 37.3 years	Yes	Yes (LSAS)	SS/Dx	0.29 <sup>ITT,SIAS</sup> § (but ES = 0.78 for LSAS)	0.86 <sup>ITT</sup>	No	No
Carlböing, 2007 <sup>33</sup>	CBT	9	WLC	Yes/150	Yes	60	Community; nr; mean age, 32.6 years	Quasi	Yes	?SS/Dx	1.21 <sup>quasi-ITT,SIAS</sup>	-0.05 <sup>quasi-ITT</sup>	No	No
Titov, 2008 <sup>34</sup>	CBT	10	WLC	Yes/125	Yes	105	Community; nr; mean age, 38.1 years	Quasi <sup>X</sup>	Yes	SS/Dx	0.93 <sup>quasi-ITT,X,SIAS</sup>	0.31	No	No
Titov, 2008 <sup>35</sup>	CBT	10	WLC	Yes/127	Yes	88	Community; nr; mean age, 36.7 years	Quasi <sup>X</sup>	Yes	SS/Dx	1.11 <sup>quasi-ITT,X,SIAS</sup>	0.10 <sup>quasi-ITT</sup>	No	No
Titov, 2008 <sup>36</sup>	CBT no therapist	10	WLC	No	No	73	Community; nr; mean age, 37.9 years	Quasi <sup>X</sup>	No	SS/Dx	0.45 <sup>quasi-ITT,SIAS</sup>	-0.07 <sup>quasi-ITT</sup>	No	No
	CBT with therapist	10	WLC	Yes/168	Yes			Yes	Yes	SS/Dx	1.54 <sup>quasi-ITT,SIAS</sup>	-0.07 <sup>quasi-ITT</sup>	No	No

**Post-traumatic stress disorder**

*Comparison to wait-list control, treatment as usual, or attention placebo control*

Lange, 2003 <sup>37</sup>	CBT	5	WLC	Yes/nr	na	184	Community; media; mean age, 39.0 years	No	Yes	SS	1.28 <sup>C,IES-<sub>8</sub></sup>	-0.24 <sup>C</sup>	No	No
Hirai, 2005 <sup>38</sup>	CBT	8	WLC	No	No	36	Community; media; mean age, 29.4 years	No	No <sup>IESR</sup> Yes <sup>SRQ-fi</sup>	SS/some Dx	1.16 <sup>C,IESR</sup> §	0.76 <sup>C</sup>	No	No
Knaevelsrud, 2007 <sup>39</sup>	CBT	5	WLC	Yes/nr	na	96	Community; media and website for selected groups; mean age, 35.0 years	Yes	Yes	SS	1.10 <sup>ITT,IESR-1</sup>	0.30 <sup>ITT</sup>	No	No

*Comparison to psychoeducational control*

Lange, 2001 <sup>40</sup>	CBT	5	PE	Yes/nr	na	30	Community; university students receiving course credit; mean age, 22.0 years	No	Yes	Trauma in past 3 months	1.51 <sup>C,IES-1</sup>	0.46 <sup>C</sup>	No	No
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**2 Summary of randomised controlled trials (RCTs) of internet intervention programs targeted at (i) depression, (ii) anxiety and (iii) both depression and anxiety (continued)**

**(iii) Depression and anxiety interventions**

Study (first author), year	Program		Human input		Participants		Short-term follow up			Long-term RCT follow-up				
	Type	Length (weeks)	Control type	Therapist/ duration*	Reminder	No.†	Setting; recruitment method; age	ITT analysis	Effective overall	Group or subgroup	Effect size (ES) difference‡	Within ES for control	Follow-up	Effective
<i>Comparison to wait-list control, treatment as usual, or attention placebo control</i>														
van Straten, 2008 <sup>41</sup>	PS	5	WLC	Yes/nr	Yes	213	Community; print media; adults	Yes	Yes	Depression: SS CSD Dx	0.53 <sup>ITT</sup> , CES-D§ 0.64 <sup>ITT</sup> , CES-D§ 0.59 <sup>ITT</sup> , CES-D	0.37 <sup>ITT</sup>	No	—
Billings, 2008 <sup>42</sup>	CBT	13	WLC	No	No	98	Workplace; employees on company health promotion list and attendees at health fair; aged 20–69 years	No	No	Anxiety: SS CSA	0.48 <sup>ITT</sup> , SCL-A§ 0.62 <sup>ITT</sup> §	0.14 <sup>ITT</sup>	No	—

AC = attention placebo control. BAI = Beck Anxiety Inventory. BDI = Beck Depression Inventory. C = completers. CBT = cognitive behaviour therapy. CES-D = Center for Epidemiologic Studies Depression Scale. CSA = clinically significant anxiety score (above cut-off). CSD = clinically significant depression score (above cut-off). DS = diagnostic severity. Dx = formal diagnosis based on standard criteria. E-INF = evidence-based depression information and feedback. F = includes face-to-face contact. IES = Impact of Event Scale; IESR = IES Revised (f = intrusions). ITT = intention to treat. LSAS = Liebowitz Social Anxiety Scale. Mail rem = mail reminder. MI = Mobility Inventory. na = missing, unclear or not supplied in appropriate form to enable calculation of effect size. nr = not reported. PE = psychoeducation. pf = panic frequency. Phone rem = phone reminder. Prev = prevention or quasi-prevention trial. PS = problem-solving therapy. SCAS-C = Spence Children's Anxiety Scale (Child Version). SCL-A = Symptom Checklist – anxiety. SIAS = Social Interaction Anxiety Scale. SM = self-monitoring. SRO-f = Stressful Responses Questionnaire – frequency intrusions. SS = self-selected. StressM = stress management. TAU = treatment as usual. WLC = wait-list control. X = excluded those dropped out after randomisation but before treatment.

\* Mean therapist time (minutes) per participant. † Total number of participants randomly assigned to a condition. ‡ Difference between treatment and control within effect sizes (see text). § Calculated from means and SDs or other relevant data in report. ¶ For overall regression analysis.